amateur radio

Vol. 37, No. 4
APRIL, 1969
Registered at G.P.O., Melbourne, for transmission by post as a periodical
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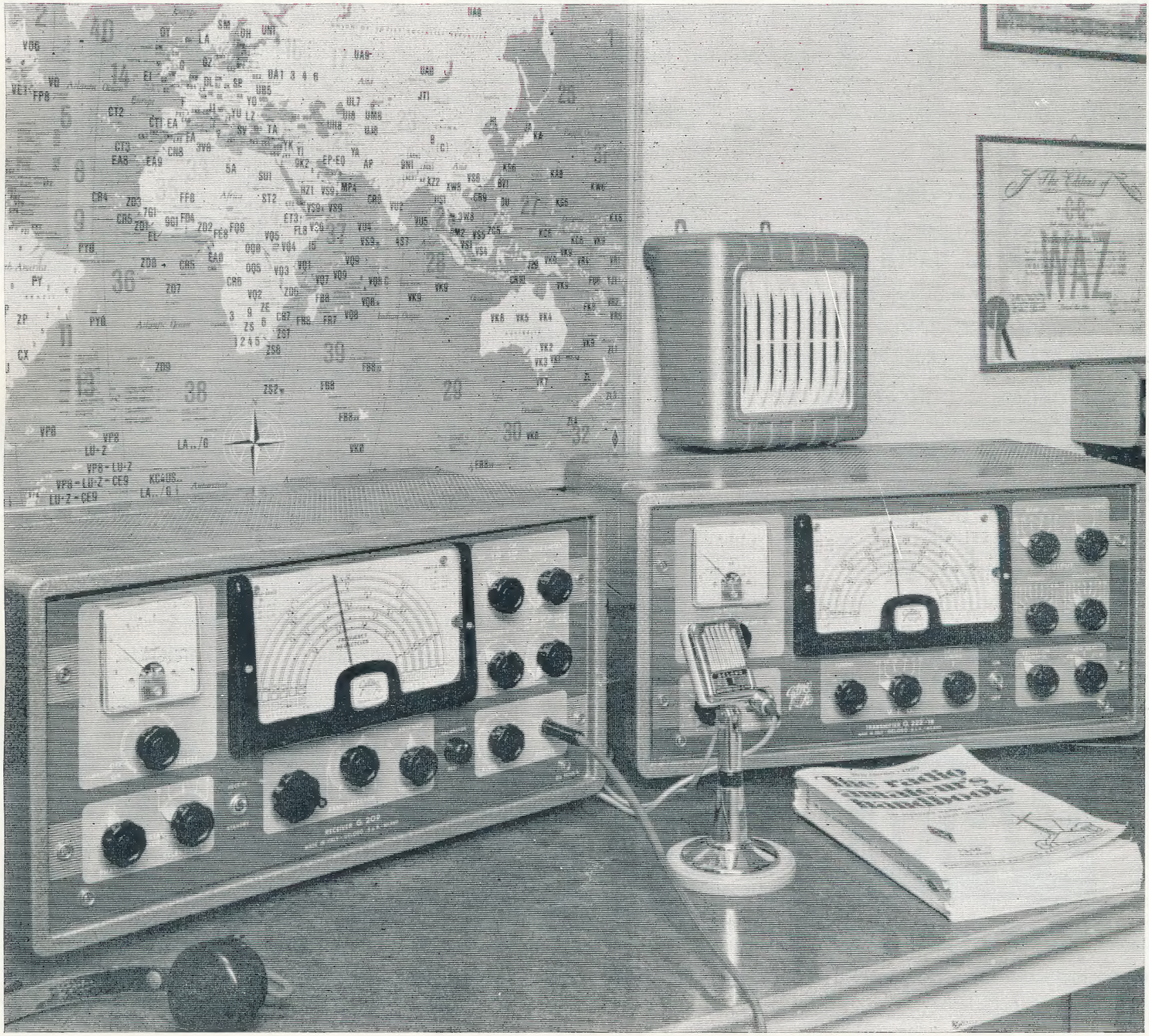

FIXED CONDENSERS

125 Volt Rating:
10, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 220, 270, 330, 390, 425, 470, 560 pF. **all 13c ea.**

0.01	uF.	160v.	12c	0.0018	uF.	600v.	18c
0.01	,,	600v	25c	0.0022	,,	400v.	12c
0.012	,,	125v	13c	0.0022	,,	600v.	18c
0.012	,,	400v	12c	0.0027	,,	400v.	17c
0.012	,,	600v.	19c	0.0027	,,	600v.	18c
0.015	,,	125v.	13c	0.0033	,,	400v.	12c
0.015	,,	600v.	19c	0.0033	,,	600v.	14c
0.018	,,	600v.	22c	0.0039	,,	400v.	12c
0.022	,,	125v.	13c	0.0039	,,	600v.	18c
0.022	,,	400v.	14c	0.0047	,,	400v.	15c
0.022	,,	600v.	24c	0.0047	,,	600v.	22c
0.027	,,	160v.	14c	0.0056	,,	400v.	15c
0.027	,,	400v.	15c	0.0056	,,	600v.	15c
0.027	,,	600v.	22c	0.0068	,,	400v.	15c
0.033	,,	125v.	14c	0.0068	,,	600v.	15c
0.033	,,	400v.	15c	0.1	,,	125v.	15c
0.033	,,	600v.	22c	0.1	,,	400v.	18c
0.039	,,	125v.	14c	0.1	,,	600v.	27c
0.039	,,	400v.	14c	0.2	,,	400v.	20c
0.039	,,	600v.	28c	0.5	,,	400v.	20c
0.047	,,	125v.	14c	0.12	,,	125v.	25c
0.047	,,	400v.	14c	0.12	,,	600v.	20c
0.047	,,	600v.	14c	0.15	,,	125v.	15c
0.056	,,	125v.	14c	0.15	,,	400v.	15c
0.056	,,	400v.	14c	0.15	,,	600v.	20c
0.056	,,	600v.	18c	0.18	,,	125v.	17c
0.068	,,	125v.	13c	0.18	,,	400v.	17c
0.068	,,	400v.	14c	0.22	,,	125v.	15c
0.068	,,	600v.	18c	0.22	,,	400v.	22c
0.082	,,	125v.	20c	0.22	,,	600v.	24c
0.082	,,	400v.	22c	0.27	,,	125v.	22c
0.082	,,	600v.	28c	0.27	,,	400v.	25c
0.001	,,	125v.	15c	0.27	,,	600v.	28c
0.001	,,	400v.	15c	0.33	,,	125v.	25c
0.001	,,	600v.	18c	0.33	,,	400v.	28c
0.001	,,	5Kv.	45c	0.39	,,	160v.	22c
0.001	Feed	Thru	29c	0.39	,,	400v.	40c
0.0012	uF.	400v.	15c	0.47	,,	125v.	28v
0.0012	,,	600v.	15c	0.47	,,	400v.	35c
0.0015	,,	200v.	15c	0.47	,,	600v.	40c
0.0015	,,	600v.	15c	0.68	,,	125v.	35c

1 Mc. CRYSTALS

Mounted in octal plug, suitable for BC221 Frequency Meter. **To clear. $8.00.**

CO-AXIAL CABLE

72 ohm 3/16 in. diam. Co-ax. Cable, new. **100 yd. roll, $18.** Postage 75c. **20c yd.**

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5 x 5/0076. Ideal for Intercoms., Telephones, etc. New. 100 yd. rolls, $17 (postage 75c), or 20c yd.

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MOBILE WHIPS

Four sections, 16 feet long
Price $3.00, postage 20c

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Type No.	259—	6 holes	x 3	inch	**17c**
,, ,,	260—	6 ,,	6	,,	**27c**
,, ,,	262—	6 ,,	12	,,	**53c**
,, ,,	270—	9 ,,	6	,,	**40c**
,, ,,	272—	9 ,,	12	,,	**70c**
,, ,,	287—	12 ,,	6	,,	**53c**
,, ,,	288—	12 ,,	9	,,	**78c**

Postage 10c

1967 CALL BOOKS

Old stock. Price 45c.

DISPOSALS SPECIALS

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10 watts. Primary: 8,000 c.t., ultra linear, 43 p.c. taps. Secondary: 2, 8, 16 ohms. Price $7.50.
40 watts. Primary: 6600/4500 ohms, push pull. Secondary: 500, 250, 125, 50 ohms. Price $10.
15 watts. Primary: 10,000/8,000 ohms push pull. Secondary: 2, 4, 8, 15 ohms. Price $5.50.
5 watts. Primary: 10,000 ohms, single ended. Secondary: 2, 3.5, 8, 15 ohms. Price $4.00.

Recording Tape Specials. Unboxed Scotch brand. New, guaranteed.
2 Reels, 900 ft., 5 inch, Polyester base, $3.95.
2 Reels, 1800 ft., 7 in. Polyester base. $7.75.

Transistor Driver Transformers, Type AMT-208, Primary imped.: 5000 ohms; secondary imped.: 1500 ohms X2. 75c or three for $2.

HIGH IMPEDANCE HEADPHONES

New. Price $2.50. Postage 20c.

LOW IMPEDANCE HEADPHONES

8 ohms. Price $2.50. Postage 20c.

POCKET RADIO

Type ER22. Complete with ear piece. Price $1.75. Postage 10c.

SPECIALS! SPECIALS!

Stereo Arms complete with Cartridge (ceramic), Price **$4.75**, postage 20c.
Dust Bug, complete, fits most turntables, **$4.75**, postage 10c.
MR3P Blank Meter Cases, no movement, **$1.50**, postage 10c.
LT91 Rectifier, 20 volts, 2 amps., **$1.50**, post. 10c
Dial Drums: 1½ in. **30c**, 3 in. **50c**, 5½ in. **70c**, postage 10c.
AC Adaptor Socket, Type J200, **55c**, postage 10c.
AC Adaptor Plug, Type P200, **75c**, postage 10c.
Transistor Plug, P112, 3-5 mm., **20c**, postage 10.
Transistor Socket to suit, **15c**, postage 10c.
200H Meter Movement, **$6.75**, postage 30c.
200H Meter Rectifier, **$1.20**, postage 20c.

SWITCHES

S/P Switch **50c**
D.P.D.T. Switch **$1.00**
Slider Switch, large type **48c**
Slider Switch, small type **32c**
Postage 10c

MULTIMETER, Model OL-64

20,000 ohms per volt d.c., 8,000 ohms per volt a.c.

Specifications:
D.C. volts: 0-0.3, 1, 10, 50, 250, 500, 1,000, 5,000.
A.C. volts: 0-10, 50, 250, 1,000.
D.C. current: 0-30 uA.; 1, 50, 500 mA.; 10 A.
Resistance: 0-5, 500K ohms; 5, 50 megohms.
Decibels: Minus 20 to plus 22 db., plus 20 to plus 36 db.
Capacitance: 250 pF. to 0.02 uF.
Inductance: 0-5000 H.
Load current: 0-0.06, 0.6, 60 mA.
Self contained batteries: 22.5v. (BL-015) x 1, 1.5v. (UM3) x 2.
Size and weight: 6 x 4-1/5 x 2 in. 650 g.
Meter movement fund. sensitivity: 30 uA., F.S.D.
Price $19.75, postage 25c.

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Model CR208E, New. Push-button tuning superhet. with r.f. amplifier. Tuning range, 530 to 1605 Kc. I.F., 452.5 Kc. Sensitivity, less than 20 db. Selectivity, more than 20 db. at plus or minus 10 Kc. Output, more than 3.5w. 8 transistors and 3 diodes. Power supply: 6v. DC negative ground, less than 1.2A; 12v. DC negative or positive ground, less than 0.8A. Price **$59.50.** Postage 70c.

TAPE CASSETTES

Type C30 .... **$1.85** Type C90 .... **$3.25**
Type C60 .... **$2.30** Type C120 .. .... **$4.25**
Postage 10c

SPEAKERS, TRANSISTOR TYPE

2¼ inch diam., 8 ohms **$1.75**
2¾ inch diam., 8 ohms **$2.00**
4 inch diam., 8 ohms **$2.25**
Postage 20c

MIKE INSERTS

MC9/BM3 Inserts. **Price $1.57**, postage 10c.

VERNIER DIALS

Type T501, 1-7/16 inches **$2.15**
Type T502, 2 inches **$2.75**
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Postage 20c

SATO COIL FORMERS

4-pin, 1¼ in. diam., 2 in. long **35c**
5-pin, 1¼ in. diam., 2 long **35c**
Postage 10c

VARIABLE CONDENSERS

Jackson, type with ¼ inch diam. shaft
25 pF. .... **$1.75** 150 pF. **$2.50**
100 pF. .... **$2.25** Postage 10c

PANEL METERS

Brand New in Cartons. Plus Postage 20c
Type F597: 0-50 uA., 2¾ in. round, mounting hole 2-1/16 in. Price $3.75.
Type F351: 0-200 uA., 2¼ in. square, mounting hole 1¾ in. Price $3.75.
Type F366: 500-0-500 uA., 2¼ in. square, mounting hole 1¾ in. Price $3.50.
0-10 volts AC, 3 in. square, mounting hole 2¾ in. Price $4.00.
Type F471: 50 volts DC, 3 in. square, mounting hole 2¾ in. Price $4.00.
Type F516: 500 volts AC, 2½ in. square, mounting hole 1¾ in. Price $4.00.
Type Q515: 150 volts AC, 2¼ in. square, mounting hole 1¾ in. Price $3.50.
Type S045: 20 volts AC, 2 in. square, mounting hole 1¾ in. Price $3.50.
Type F497: 1-0-1 mA., blank scale, 2¼ in. square, mounting hole 2¾ in. Price $3.00.
Type F498: 1-0-1 mA., blank scale, 3 in. square, mounting hole 2¾ in. Price $3.75.
Type F499: 1-0-1 mA., blank scale, 4¼ in. square, mounting hole 3¼ in. Price $4.25.
Type F555: 10 mA., blank scale, 2¼ in. square, mounting hole 1¾ in. Price $3.00.
Type F490: 50-0-50 uA., blank scale, 2¼ in. square, mounting hole 1¾ in. Price $4.00.
Type F491: 50-0-50 uA., blank scale, 3 in. square, mounting hole 2¾ in. Price $4.50.

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Price 75c each.

HAM RADIO SUPPLIERS

323 ELIZABETH STREET, MELBOURNE, VIC., 3000

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We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Valves and Transistor Radios, Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensers, Welwyn Resistors, etc.

amateur radio

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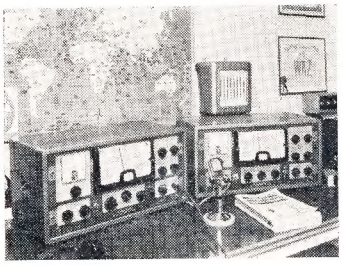
COVER STORY



Shown on our front cover this month is the "ham shack" laboratory of Geloso, Milan, Italy. This equipment was operated by John Geloso (died 1st Feb., 1969), who will be remembered by many operators throughout the world as one of the early members of the Italian Radio Society. Depicted left to right: The Geloso G209 receiver and the G222 a.m. transmitter.

COMPONENT "CHECK-LIST"

A selected range of products useful for Amateur application

Prices include Sales Tax but are subject to change without notice

Please include Freight with Order

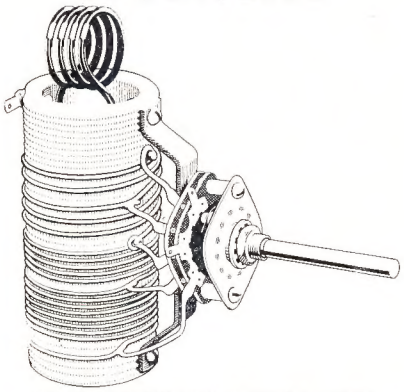
SUB-MINIATURE ELECTROLYTIC CONDENSERS, ELNA TYPE RB

Type RB Electrolytics are particularly suited to printed circuit wiring. Pig-tails are brought out at one end for vertical mounting. Low leakage, extended shelf life, compact and robust, high ripple rating, low cost.

Capacity	Wkg. Volts	Surge Volts	Ripple Current	Price (inc. S. Tax)
0.5 uF.	25	30	10 mA.	19 Cents
2 ,,	12	14	10 ,,	19 ,,
2 ,,	25	30	10 ,,	20 ,,
5 ,,	10	12	10 ,,	19 ,,
5 ,,	12	14	20 ,,	19 ,,
5 ,,	25	30	25 ,,	20 ,,
10 ,,	10	12	10 ,,	19 ,,
10 ,,	12	14	25 ,,	19 ,,
10 ,,	25	30	40 ,,	24 ,,
25 ,,	25	30	130 ,,	24 ,,
25 ,,	50	55	150 ,,	26 ,,
30 ,,	10	12	50 ,,	20 ,,
30 ,,	12	14	100 ,,	20 ,,
50 ,,	10	12	60 ,,	24 ,,
50 ,,	12	14	200 ,,	24 ,,
50 ,,	25	30	250 ,,	26 ,,
100 ,,	10	12	200 ,,	24 ,,
100 ,,	12	14	300 ,,	24 ,,
100 ,,	25	30	350 ,,	31 ,,
250 ,,	12	14	400 ,,	28 ,,

Normal range of Power Supply Filter Condensers available in values of 8, 16, 24, 32, 50, 100 and 200 uF. at working voltages of 350/500 v.

PI-COUPLERS



WILLIS MEDIUM POWER TYPE

For use up to 600 watts p.e.p. Match plate loads of 2,000 to 3,500 ohms (Z) and higher into co-axial cable. Operating Q increases on higher frequencies to increase harmonic suppression, enabling practical values of tuning capacity to be used on 10 and 15 metres and allowing for wiring inductance (L). Incorporates extra switch section for shunting additional capacity (C) if required, or switching other circuits. Switch rated for 10 amps. at 2,000 volts with contact resistant (R) of 0.8 milliohms. **Price $8.85.**

Geloso Pi-Coupler Type 4/111 for use with parallel 807s, 6146s, etc. 75 watts. **$3.94.**

Geloso Pi-Coupler Type 4/112 for use with single-ended 807, 6146, etc. 75 watts. **$3.94.**

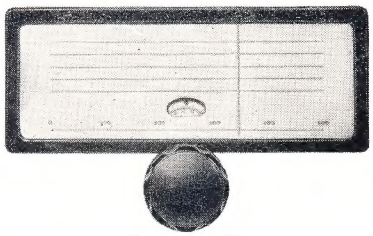
Geloso Pi-Coupler Type 4/113 for use with parallel 807s, 6146s, etc. 100 watts. **$$4.97.**

LOW PASS FILTERS

A "Cabena" Low Pass Filter will fix t.v.i. Cut-off frequency, 30 Mc., attenuation at 60 Mc. better than 30 db.; insertion loss, negligible. Impedance 50-72 ohms.

Price $11.50

EDDYSTONE INSTRUMENT DIALS



Cat. No. 898

GEARED SLOW-MOTION DRIVE ASSEMBLY

A high grade assembly designed for instrument application. The movement is gear-driven and fly-wheel loaded, giving a smooth, positive drive, with a reduction ratio of 110 to 1. The pointer has a horizontal travel of 7 inches. A circular vernier scale, marked over 100 divisions, rotates five times for one traverse of the pointer, and, read with the "100" scale on the dial, provides a total of 500 divisions.

Price $22.22

TEST EQUIPMENT

S.W.R. METERS

KYORITSU Model K-109 Standing Wave Ratio Bridge, 1:1 to 1:10 s.w.r. Impedance 50 and 75 ohms. Frequency range 1.5 to 60 Mc. Includes 0-100 d.c. microammeter. **Price $19.**

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How L.P.S. Saves You Time and Money

1. Protects all metals from rust and corrosion.
2. Penetrates existing rust—stops it from spreading.
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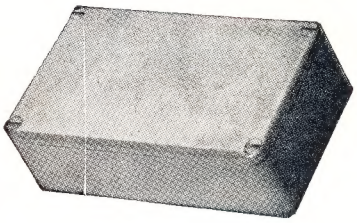
4. Lubricates even the most delicate mechanisms at extreme temperatures.
5. Penetrates to free rust frozen parts, nuts, bolts, etc.
6. Prevents equipment failures due to moisture (drives it out).
7. Lengthens life of electrical and electronic equipment—improves performance.
8. Restores equipment damaged by water contamination and corrosion.
9. Penetrates and protects plated and painted metal surfaces.
10. Protects metals from salt atmosphere, acid and caustic vapors.
11. Loosens dirt, scale, minor rust spots and cleans metal surfaces.
12. Eliminates squeaks where most everything else fails.

2 oz. Cans	75c nett
7 oz. Cans	$1.25 nett
16 oz. Cans	$2.25 nett



INSTRUMENT BOXES

These virtually water-tight die-cast boxes are made of zinc alloy material in four sizes. Each box is supplied with a close-fitting flange lid, securely held with countersunk 4 BA screws. Natural finish. These substantial boxes are invaluable for many purposes. Sizes available:

Type 6908/P (650) 4½ x 3½ x 2 in.	**$2.85**
Type 6827/P (845) 7¾ x 4½ x 2 in.	**$4.60**
Type 7134/P (896) 4¼ x 2¼ x 1 in.	**$1.98**
Type 903 7⅜ x 4-11/16 x 3 in.	**$4.97**

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POLYESTER TUBULAR

400 Volts Working

1,000 to 10,000 pF.	12 Cents ea.
12,000 to 22,000 pF.	14 ,, ,,
27,000 and 33,000 pF.	15 ,, ,,
39,000 and 47,000 pF.	15 ,, ,,
56,000 and 68,000 pF.	16 ,, ,,
0.082 and 0.1 uF.	19 ,, ,,
0.12 and 0.15 uF.	23 ,, ,,
0.27 uF.	33 ,, ,,
0.33 uF.	36 ,, ,,
0.39 uF.	40 ,, ,,
0.47 uF.	43 ,, ,,

(Prices include Sales Tax)

GREENCAPS

METALLISED POLYESTER CONDENSERS

A range of high quality sub-miniature capacitors ideally suited to transistorised circuitry and all low-medium voltage applications. An economical substitute for existing ceramic and polyester types. High capacitance stability from minus 25 deg. C. to plus 85 deg. C.

100 Volts Working

0.001, 0.0022, 0.0033, 0.0039, 0.0047, 0.0056, 0.0068, 0.0082, 0.01 and 0.022 uF.	12 Cents ea.
0.033, 0.039, 0.047, 0.056, 0.068, 0.082 and 0.1 uF.	16 ,, ,,
0.22 uF.	20 ,, ,,

200 Volts Working

0.33 and 0.39 uF.	24 Cents ea.
1.0 uF.	42 ,, ,,
2.0 uF.	58 ,, ,,

(Prices include Sales Tax)

TANTALUM ELECTROLYTICS

Solid Tantalum Electrolytic Condensers suited to transistorised, good quality equipment, having a better power factor and a superior capacitance stability with temperature and time. Range from 0.1 uF. to 50 uF. with an operational temperature range of from minus 40 deg. C. to plus 85 deg. C. For indicating the anode (plus) connection, tantalum electrolytics are provided with a RED spot. When this spot is viewed with the leads downwards, the anode is at the right of the spot.

35 Volts Working, ex stock

Values: 0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.7, 1.0, 1.5, 2.0, 3.0 and 4.0 uF.

Price: 56 Cents each (inc. S.T.)

WILLIAM WILLIS & CO. PTY. LTD.

430 ELIZABETH STREET, MELBOURNE, VIC., 3000. Telephone 34-6539

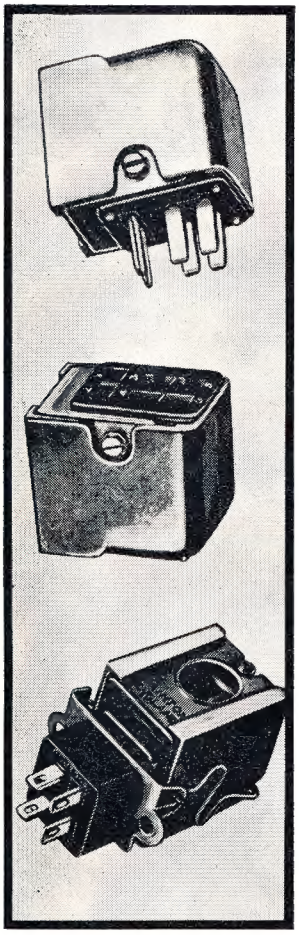
Please include Freight with Order

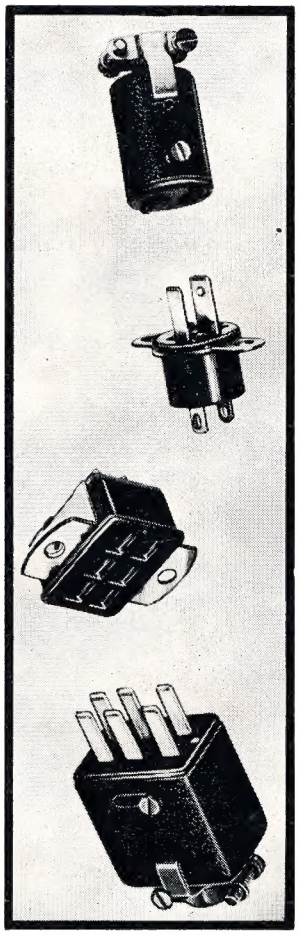
PAINTON RELIABILITY

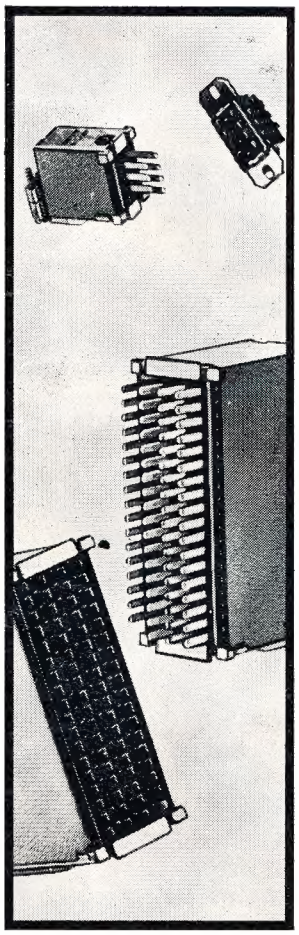
at the RIGHT price for these

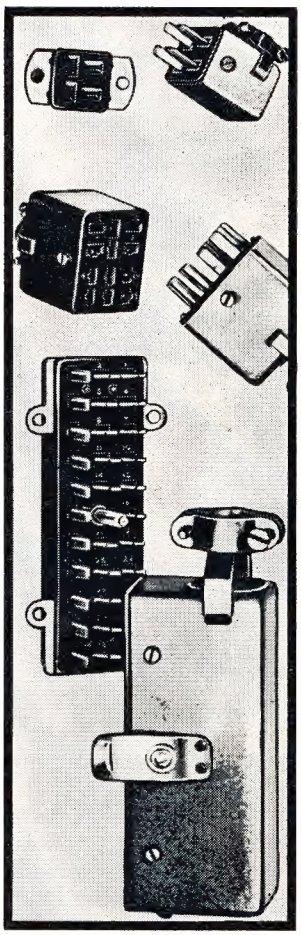
CONNECTORS

EX-STOCK DELIVERY









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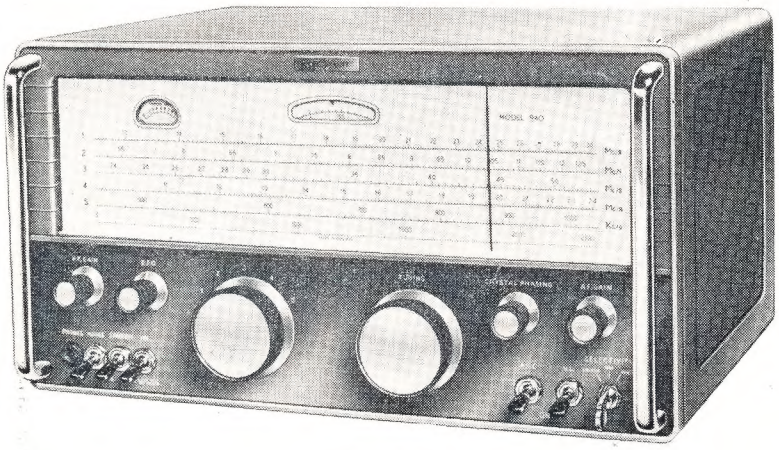

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W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	317/340	VK5AB	298/314
VK3AHO	312/326	VK4FJ	285/304
VK6RU	308/333	VK4KS	277/292
VK4HR	306/324	VK4TY	275/278
VK2JZ	304/321	VK2APK	272/277
VK6MK	304/323	VK3TL	271/277

Erratum Feb.: Cert. No. 93 shown as VK4XY should read:
Cert. No. 93 VK4XJ 115/119.

New Members:

Cert. No. 94—VK4RF 112/112
Cert. No. 95—VK3ALM 106/106

Amendments:

VK3ZE	210/213	VK5BB	151/154
VK4PX	192/193	VK3TG	147/151
VK3VK	171/171	VK4UC	124/124

C.W.

VK2QL	300/322	VK3YL	267/284
VK3AHQ	292/306	VK2APK	266/274
VK4FJ	290/314	VK3ARX	266/275
VK3CX	289/312	VK6RU	266/289
VK2AGH	282/296	VK3NC	264/277
VK4HR	277/300	VK3XB	264/278

Amendments:

VK3RJ	243/257	VK2QK	146/146
VK3KS	219/226	VK4RF	121/133

OPEN

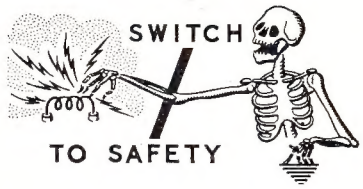
VK2AGH	311/331	VK4TY	301/315
VK4HR	310/334	VK4FJ	298/322
VK6RU	310/335	VK2APK	289/299
VK6MK	305/324	VK3ARX	289/298
VK2VN	304/321	VK3TL	287/293
VK2EO	302/325	VK3XB	286/274

New Members:

Cert. No. 116—VK2AND 102/102
Cert. No. 117—VK4RF 167/179

Amendments:

VK4KS	279/298	VK4PX	212/217
VK4UC	218/219		



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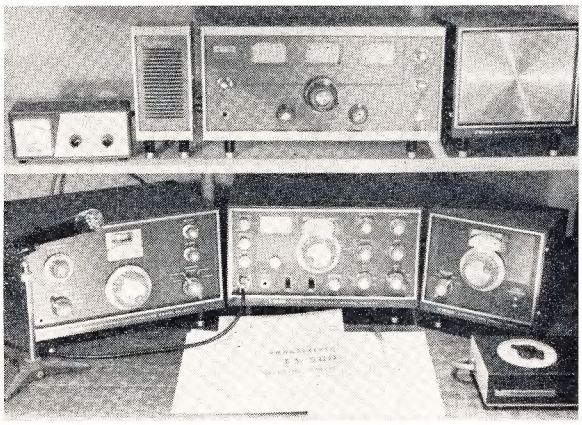
ATTENTION SOUTH AUSTRALIAN AMATEURS

TRIO

RECEIVERS



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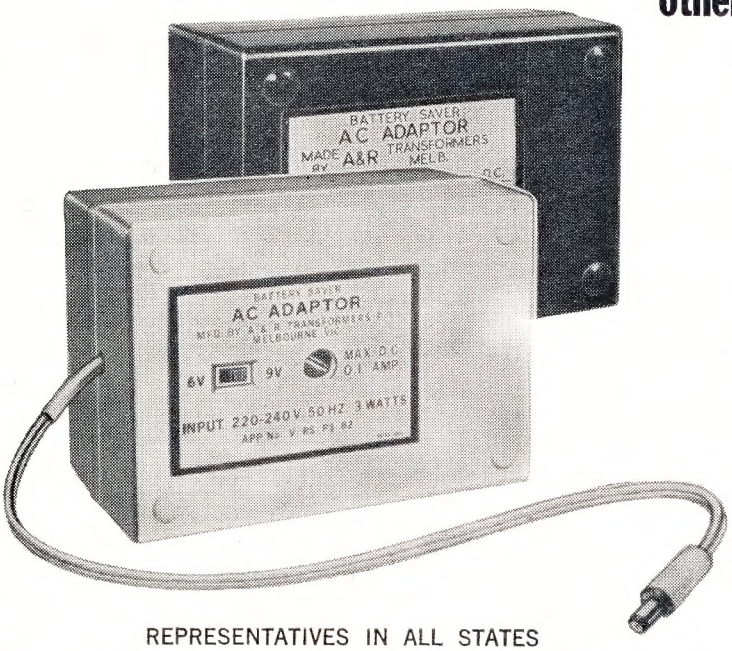

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FEDERAL COMMENT

PIRATES

The excellent editorial reproduced below needs no explanation. In passing, it is worth noting that Departmental enquiries were not limited to New South Wales but also took place in Victoria with, it is believed, satisfactory results.

We are grateful to Don Miller, VK2GN, President of the N.S.W. Division, for permission to publish his article which originally appeared in the monthly Bulletin of the N.S.W. Division.

"Some recent activities in Sydney by the P.M.G. Department and the Police Department, and the resultant publicity in news media with references to Radio Amateurs, caused quite a number of members to contact the Institute. These members wanted Council to take some action to counter this adverse publicity. Unfortunately, the press applies the term Radio Amateur loosely to any radio hobbyist, be he licensed or otherwise, and this made any immediate action difficult. However, this is under scrutiny at the moment and some worthwhile line of approach is being sought.

"As licensed Radio Amateurs, we can be concerned only with what goes on within our authorised bands. The question is—is our own house clean? I am afraid too many of us are overly tolerant of known and, in some cases, self-confessed 'pirate' operators in the Amateur bands, instead of actively discouraging this type of activity. How many of them would continue operation if we all ignored transmissions from any such stations and passed the word around the bands that VK2XYZ is an illegal operator? This appears to me to be the most effective method of discouragement—combined with a few calm words of advice when one finds oneself in QSO with a 'pirate'.

"Both h.f. and v.h.f. bands seem to becoming equally popular with such operators, and recently I had the pleasure of hearing a relatively new licensee 'read the riot act' in a calm and impersonal manner to a self-confessed pirate with a self-allocated, somewhat indelicate, call sign, who was heard to state that he saw no reason to bother with exams., etc., when he already had his shack papered with QSLs from all over the world.

"Do YOU remember how much effort you expended before that long-awaited Amateur Operator's Certificate of Proficiency arrived in the mail?

"Do you value your hard-earned privileges so lightly that you are prepared to share them with others too indolent to make a similar effort?

"Over to you, gentlemen."

—Don Miller, VK2GN.

PROJECT—SOLID STATE TRANSCEIVER

PART SIX

H. L. HEPBURN, VK3AFQ, and K. C. NISBET,† VK3AKK*

Only one module will be described in this article—the transmitter mixer. Fig. 17 gives the circuit diagram, from which it can be seen that the module consists of a Motorola 1550G integrated circuit used as a mixer and a 2N3564 emitter follower.

Input from the heterodyne oscillator chain is gated by D25 to L25, which is a link winding on the cold end of the tuned circuit L26/C1. Reference to the receiver front-end diagram will show that the same input is made to all the receiver mixers in parallel with no gating used. The need to add a gate to the transmit mixer arises from the method of coupling used. Whereas the various receive mixers are capacitively coupled to the hetrodyning source, the transmit mixers are inductively coupled and, if not isolated in some way, the input to the "active" module would be effectively short circuited by the link couplings of all other "inactive" modules.

When h.t. is applied to the "active" module via the bandswitch, D25 is switched into the conducting state via the 47 ohm/0.1/1K network. L26/C1 is broadly resonant around the injection frequency. Input to the 1550G is across pins 1 and 4 with pin 4 kept at r.f. earth potential by the 0.1 capacitor.

The 9 Mc. s.s.b. output from the tx filter amplifier (Fig. 11, Feb. 1969 "A.R.") is applied to pin 10 of the I.C. via the 1-2K potentiometer and an 0.047 uF. capacitor.

The potentiometer acts as a drive control and is front panel mounted. Since pin 10 of the 1550G is at a relatively high impedance, it is possible to use paralleled capacitive coupling to other mixers and obviate yet another switch bank.

Output at signal frequency from the 1550G is from pins 6 and 9 with pin 9 kept at r.f. earth potential by the 0.1 uF. capacitor and receiving h.t. feed via the 100 ohm decoupling resistor.

L27/C2 and L28/C3/C4 are resonant at the signal frequency and serve to remove all but the required mixing product from the output. L27 and L28 are inductively coupled.

C3 and C4 form a capacitive divider across L28 to give the necessary low impedance input to the 2N3564 emitter follower stage.

Output from the emitter follower is taken via the 0.047 uF. capacitor to the p.a. board to be described later.

Coil winding data is given in Table 1.

As in the case of the receiver front-ends, there is one complete "train" for each band. Each p.c.b. contains two signal "trains". Thus two p.c.b's are needed to cover four bands, three p.c.b's for six bands and four p.c.b's for eight bands.

* 4 Elizabeth Street, East Brighton, Vic., 3187.
† 25 Thames Avenue, Springvale, Vic., 3171.

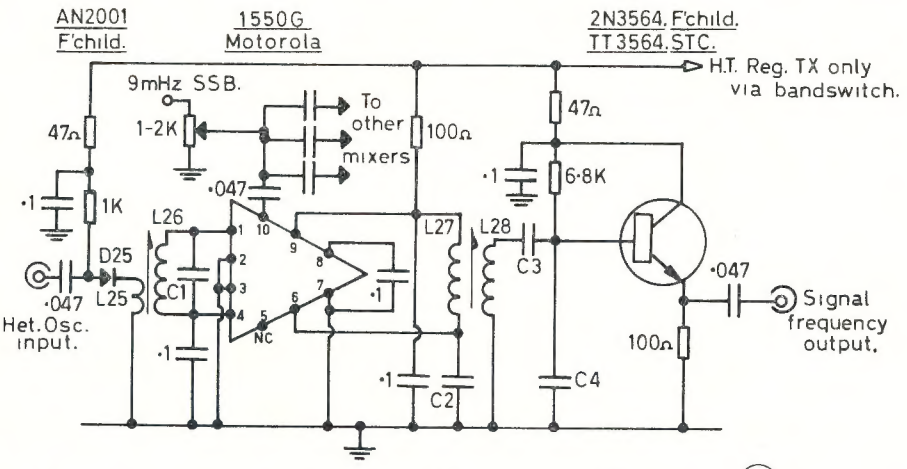


FIG. 17. 4 BAND TRANSISTOR TRANSCEIVER-TX MIXER.

Band	L25 Link	L26	L27	L28	C1 pF.	C2 pF.	C3 pF.	C4 pF.
160	6 turns	38 turns	80 turns	80 turns	33	470	470	4700
	33 B.S.	33 B.S.	39 B.S.	39 B.S.				
80	5 turns	30 turns	55 turns	55 turns	33	330	330	1500
	33 B.S.	33 B.S.	33 B.S.	33 B.S.				
40	4 turns	25 turns	38 turns	38 turns	22	100	150	1000
	33 B.S.	33 B.S.	33 B.S.	33 B.S.				
20	5 turns	34 turns	28 turns	28 turns	220	47	68	560
	33 B.S.	33 B.S.	26 B.S.	26 B.S.				
15	5 turns	30 turns	25 turns	25 turns	47	33	33	330
	33 B.S.	33 B.S.	26 B.S.	26 B.S.				
10	4 turns	20 turns	15 turns	15 turns	22	33	47	220
	33 B.S.	33 B.S.	26 B.S.	26 B.S.				

Table 1.—Coil Winding Data—Transmitter Mixers.

Note.—All coils wound on Neosid 722/1 bakelite coil formers; all use F29 slugs.

AVAILABILITY

Full kits are available on application to 4 Elizabeth St., East Brighton, Vic., 3187. Prices are as follows:

(a)	Single-band kit	$10.40
(b)	Two-band kit	$16.60
(c)	Three-band kit	$22.90
(d)	Four-band kit	$28.90
(e)	P.c.b. only .... each	$2.00
(d)	Instructions .. .... per set	$1.00

— . . . —

ADDITIONAL TIME SIGNAL FROM VNG, LYNDHURST

On Monday, 3rd February, 1969, at 0600 E.A.S.T. an additional time signal broadcast commenced from station VNG, Lyndhurst, Vic.

The broadcast will be of an experimental nature on 20.5 Mc., using the time signals and voice announcements of the normal VNG service. The emission will be single sideband, reduced carrier, with the time signal appearing 1 Kc. higher than the assigned frequency. Time of emission will be 0600 to 2000 E.A.S.T. daily (i.e. 2000 to 1000 U.T. or G.M.T. daily).

With the commencement of this additional broadcast, the full schedule for time signal transmissions from VNG, Lyndhurst, Vic., will become:

Time of Emission U.T.	Frequency Kc.	Type of Emission
*0945-2045	4500, 7500	DSB
*2100-0930	7500, 12000	DSB
2000-1000	20500, 25500	SSB

* Times of resumption of emission following the break for frequency change are approximate.

—P. R. Brett,
Senior Assistant Director-General
(P.M.G. Research Laboratories)

NEW IDEAS ON AMATEUR TELEVISION

PART ONE—INTRODUCTION

GRAHAME WILSON, VK2ZGW/T*

IT is ten years since the last series of articles on Amateur Television has appeared in the pages of "Amateur Radio". For some time now it has been quite evident that there is a great deal of interest in Amateur Television, but very little know-how as literature on the subject is rather rare or not suitable for Amateur requirements. The purpose of this series of articles is to introduce the Amateur (yourself) to Amateur Television and to let you know what it is all about.

Amateur Television, today, is not as complex as many Amateurs imagine. The day has passed when Amateur Television was restricted to the broadcast engineers and their complex equipment, now almost any enthusiastic Amateur can build a television camera with very little cost. Indeed, a simple camera including the hard-to-get items such as the vidicon and yoke can be built for less than $50 and can actually be simpler than a s.s.b. transmitter. Not many s.s.b. stations, with their complex and expensive transceivers, can brag of a cheaper set-up.

Ten years ago it would have been quite impractical for the average Amateur to attempt the construction of a television camera because of complexity, cost and availability of parts. Since then, circuits have become much simpler requiring only about six valves or the equivalent number of transistors.

The hard-to-get items are now easily obtained through various channels at quite reasonable prices. An illustration of the simplicity of ATV (Amateur TV) is that high school students in the U.S. are building cameras for science projects!

Surely then Amateurs should have little trouble starting in ATV.

With little doubt ATV has more unexplored facets of electronics than any other branch of Amateur Radio, but many Amateurs have little or no desire to start in ATV or, for that matter, any experimental electronics since the advent of the commercial transceiver. It is, in my opinion, very important that Amateurs keep up the experimental nature of their hobby. Today Amateurs must diversify their interests in the light of the enormous technological developments that have taken place in electronics over the last few years. In the early days of radio, electronics was radio, today radio is only a very small part of electronics, because of this Amateurs must look to other fields in electronics to keep abreast of the times. The Radio Amateur should concern himself more with amateur electronics; television provides an ample opportunity to do this. Television has been often called "that epitome of electronics" because of its very diverse nature, covering everything from d.c. to microwaves and pulse circuits to the photoelectric phenomena, the field of experimentation is enormous. There is something of interest in television for every Amateur.

Moving from the field of radio into the field of television, one experiences a completely different outlook on electronics. In radio we consider "systems" such as a communications receiver on the basis of "sine-wave thinking", that is to say we design the system to accept and "process" sine waves according to what we want to do. In television, we do exactly the opposite, we **must** think in pulses **not** in sine waves as we have been accustomed.

At first this is a little difficult, but one soon becomes used to it and after a short while you think nothing of it as it becomes the normal thing to do. When you get to this stage you find that those nasty circuits, that you once thought only engineers played with, now make sense. You can't believe the excitement that you can get out of experimenting with multivibrators, bistables and the like until you have tried it!

The usual reaction is that you ask yourself why you didn't start experimenting in this field years ago.

Yes, it is a really fascinating field, the main thing is not to lose heart along the way, you'll get the hang of it finally.

ACTIVE GROUPS

A question I am often asked, "What does ATV involve, what sort of performance can one expect?" In Australia at the moment there are about 280 Amateurs licensed to transmit television and about a dozen do, occasionally! About five times this number could go on the air within a short space of time if they wanted to. As far as I know, there are only two groups of ATVers in Australia, one in Adelaide and one here in Sydney.

The group in Adelaide has been going for some time now and they have had a reasonable amount of success from transmitting pictures over quite long distances (about 90 miles) to demonstrating colour television at the Adelaide Show.

The group here in Sydney is smaller and has been going only about six months. It has about eight members, two of whom are on the air with the possibility of about three more or so in a couple of months. The two Amateurs on the air at the moment are Vic Barker, VK2ZVV/T, who has two cameras, one home-made and the other an E.M.I. industrial camera; he also has a colour television (home-brew) and a colour sync. pulse generator (P.A.L.). The other is Barry Gerdes, VK2ZAH/T, who also has two cameras, an E.M.I. and a Philips.

Both stations are having slight problems with their transmitters, but by the time this article goes to press all the bugs, we hope, will be ironed out. At the moment both stations can be picked up over a distance of about five to seven miles.

The actual performance Amateurs can expect from Amateur Television depends on the amount of work they are prepared to put into it. Most Amateurs will have little trouble in obtaining industrial quality of about 350 lines and about 30 db. signal to noise ratio. On the other hand, Amateurs who are prepared to do a little extra work should not have much trouble in obtaining broadcast quality although transmission of the picture will degrade the performance a little.

The distances Amateurs can expect to work will vary a great deal, depending on transmission power, location and the like, there should be little difficulty working twenty miles under reasonable conditions. On 432 Mc., British Amateurs have worked about 216 miles for a good picture. Here in Australia, the maximum distance covered is just under one hundred miles.

GETTING STARTED

I think that is about enough general information—at least for the moment—and should give you some idea of what ATV is all about. I would now like to give you some idea of how you can actually get started.

Of course the first thing is, obviously, to get yourself some television "hardware"—things like vidicons, scanning coils, photo-multipliers and the like. As I said earlier, this is not as difficult and as worrying as it may first seem as there are several different sources from which they may be obtained. Firstly, they may be bought new from the manufacturer, secondly they may be obtained in a used condition as industrial throw-outs from TV stations, etc., and thirdly they may be bought new from the British Amateur Television Club (B.A.T.C.)

Vidicons obtained from the manufacturers come in several different varieties:—

(1) Broadcast quality, costing between $100 to $300.
(2) Industrial quality, costing between $50 to $150.
(3) Rejects and seconds, costing between $20 to $40.

As one can see, the rejects and seconds will be the most obvious choice for most Amateurs. These are quite satisfactory for Amateur use as they usually have only minor blemishes on the target which are not very noticeable under normal operating conditions. As far as I know, the only company who deals in reject vidicons is E.M.I., if there are others, please let me know and I will pass the information on in further notes. I think also E.M.I. might supply an industrial vidicon yoke, but it would probably be a little costly.

While television stations go through reasonable numbers of vidicons, they are usually difficult to obtain from this source for two reasons, one being that TV station technicians collect and hoard them with little intention of use, and the other being that they are smashed

* 31 Ada Street, Katoomba, N.S.W., 2780.

(the old tubes) by customs so that no duty has to be paid on the new tube. One can come away from this site almost crying. Unfortunately the people responsible do not realise that it will cost everyone more in the long run.

If you know anyone who has a few vidicons and who is not using them, try and persuade him to sell them at a reasonable price.

Probably the best method to obtain a vidicon or other ATV gear is to become a member of the British Amateur Television Club (B.A.T.C.). This club was formed in 1949 to inform and co-ordinate the activities of Amateur Television enthusiasts and is the leading ATV organisation with almost one thousand members all over the world.

B.A.T.C., like all other Radio Amateur organisations, offers publications and services to its members, the most important being its sale of vidicons and yokes, its technical query service, and its quarterly twelve-page publication, "CQTV". If you would like to become a member of B.A.T.C. you can write to the Honorary Treasurer at the following address:

Mr. M. J. Sparrow, Hon. Treasurer,
British Amateur Television Club,
White Orchard,
64 Showell Lane, Penn,
Wolverhampton, Staffs,
England,

enclosing 10/- sterling, which is the annual fee. This is very reasonable considering the benefits you get.

Any correspondence sent to B.A.T.C. is promptly dealt with and you can be assured of a reply almost immediately. The club itself is affiliated with the R.S.G.B. but runs as an independent organisation. This enables it to function in a more versatile manner in its own field of interest.

The items B.A.T.C. has for sale to members are vidicons, yokes, "C" mount lens flanges, vidicon bases and film strips of back editions of "CQTV". The vidicons are E.M.I. **separate** mesh (I will explain the importance of this in later articles) seconds, the yokes are also E.M.I. and were especially made for the club and are designed to be used with transistor circuitry. The film strips are of ten back editions of "CQTV" (about 120 pages), each page is photographed and takes up one frame of 35 mm. positive film. The prices of the items available are as follows:—

E.M.I. vidicons, **separate** mesh, second grade, one inch, £10.

Yokes (field, line and focus coils) for transistor circuits, £6/15/0.

Vidicon bases, 5/-.

"C" mount lens flanges, 8/6.

Film strips of 10 editions of "CQ TV", 15/6.

Note all these prices are **sterling**, you can arrange to send the correct money at your local post office in the form of a standard money order. Please **do not** forget to include postage, the yoke weighs about two pounds and costs about 8/6 stg. to send out here.

If you are thinking of taking ATV up, I seriously suggest you join B.A.T.C.

(To be continued)

THE FERRITE BALUN*

Its Uses and How to Make Your Own

JOHN HUGO, ZS1SC

This is a popular device in use today by many Amateurs. If you look at any of the recent Amateur magazines from the U.S.A. ("CQ," "QST," "73," etc.) you will see several makes of Ferrite Baluns being advertised.

Why a Balun? For what purpose? The one which we will refer to here is the 1:1 variety, which basically is a matching device which is used to efficiently feed a balanced and symmetrical antenna system of 72 or 50 ohm characteristic impedance with an unbalanced co-ax feedline of corresponding characteristic impedance.

Yes, unbalanced to balanced feed or vice-versa, that is what it does. You might say, "We've been feeding dipoles with co-ax. for years and they work fine." So they do, but they work better with this gadget!

Why? Because:

(a) Feedline radiation is eliminated.
(b) The radiation pattern (directivity) is improved.

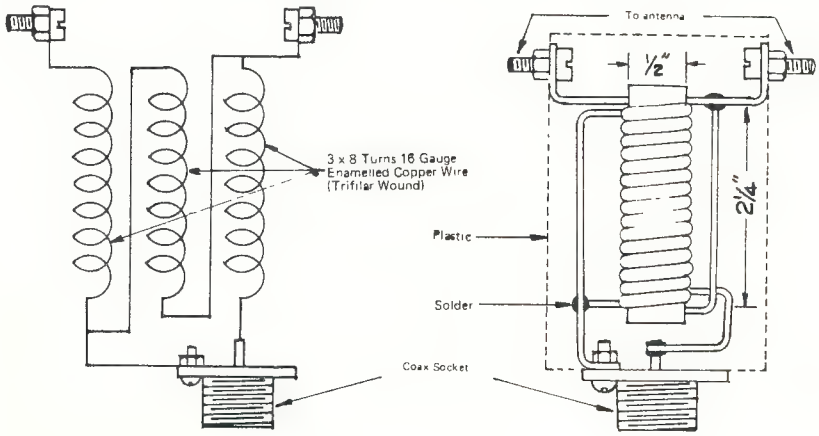
Obviously (a) has many advantages —less power wasted and more power radiated from the antenna, less chance of b.c.i., better s.w.r. and so on.

With unbalanced feed to a dipole or driven element of a quad or yagi radiation is also inclined to be lopsided and so the pattern is upset, causing a loss in ultimate front to back ratio and of course forward gain. Many worthwhile advantages—not so?

The best news, however, is the ridiculous simplicity with which you can "roll your own" Ferrite Baluns. All you need for a 3 to 30 Mc., wide-band 1:1 balun capable of easily handling a kilowatt with completely negligible insertion loss is the following:

(1) A few feet of 16 gauge enamelled wire.
(2) Three feet of Ferrite Rod (up to 30 Mc. varieties).
(3) A co-ax. connector socket.
(4) A couple of solid nuts, bolts and washers.
(5) A plastic tumbler—Tupperware box, or other insulating protective cover.

The accompanying figure shows the construction—the coils (each 8 turns) are trifilar wound on the ferrite rod and the ends are connected as shown. The whole thing then is encased in the plastic box to make it weather proof—with the co-ax. connector plug at the bottom and the bolts opposite one another at the top, which, incidentally, go to the driven element on your beam, quad or dipole (with the shortest connecting leads possible!).



EXPANDED VIEW

ASSEMBLED VIEW

These jobs should be particularly suitable in a co-ax. fed inverted vee or multiband trap dipole. They are so cheap and easy to make that they could also in fact be ideally used on each in the separate driven elements of a triband quad and should materially improve the directional properties of antenna. Why not try it?

— . . . —

* Reprinted from "Radio ZS," July 1968.

CONTEST CALENDAR

Until 13th April: I.A.R.C. Phone Contest.
5th/6th April: Polish DX C.w. Contest.
12th/13th April: "CQ" W.W. WPX S.s.b. Contest.
19th/20th April: Helvetia 22 Contest.
26th/27th April: P.A.C.C. C.w./Phone Contest.
16th/17th August: Remembrance Day Contest.
4th/5th October: VK-ZL-Oceania DX Contest 1969—Phone Section.
11th/12th October: VK-ZL-Oceania DX Contest 1969—C.w. Section.
25th/26th October: "CQ" W.W. DX Contest—Phone Section.
29th/30th October: "CQ" W.W. DX Contest—C.w. Section.
6th Dec. 1969 to 11th Jan. 1970: Ross A. Hull Memorial Contest.
1st/2nd Feb. 1970: John Moyle National Field Day.

THE WORLD WITH A TRIANGLE

PART TWO

WAL SALMON, VK2SA*

WHEN Part One of this article was written, reference "Amateur Radio," October 1968, I had no idea that anything further would germinate from the triangular antenna configuration. However, on listening to recent reports on the air of failures in beam turning mechanism and two reports of Quads being lost in recent heavy winds, I was prompted to give some thought to the development of a fixed wire Quad to radiate in either of two directions, and the direction control to be located in the radio shack and the construction to be such as to entirely eliminate the use of spiders, booms or floppy fibre glass or Rangoon cane.

Reference might now be made (Fig. 1) to the triangular formation associated with the three masts at VK2SA and it will be seen that not one Quad, but two Quads can be accommodated, in addition to a 40 metre antenna, and if some electrical means could be devised to control the directivity of the two Quads, a fixed beam transmitting system capable of transmitting in four directions would be possible.

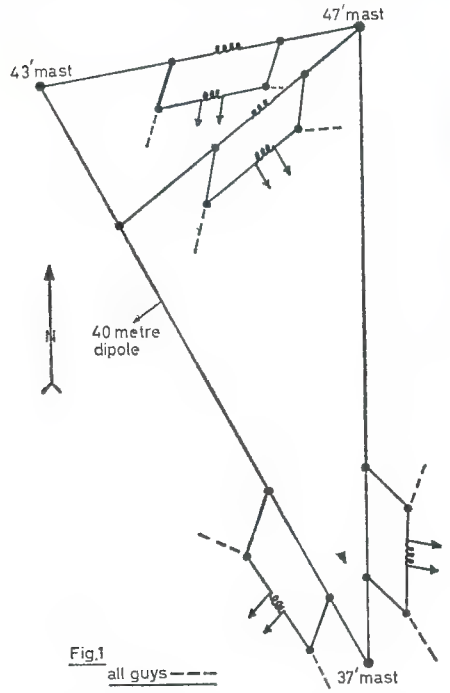


Fig.1

In addition the system would eliminate the use of beam turning motors and the absence of cane or fibre glass supports would provide a greater degree of safety in heavy winds.

Finally, the all-wire construction would allow the Quads to be hoisted or lowered to the ground by one person in a matter of minutes.

All these advantages have been achieved at VK2SA, and now for some practical data on the construction of the monsters.

* 77 Flora Street, Kirrawee, N.S.W., 2232.

Reference was made to various sources of information on Quads and it was apparent that there was conflicting evidence on the formula for wire lengths, also that a Quad could not be dipped with a grid dip oscillator. Feed systems were also considered and co-axial cable was ruled out as I had a heap of 300 ohm t.v. open-wire line to play with. In regard to the method of feeding the Quad, it was considered that the method of tapping across a loading coil with the 300 ohm line would be satisfactory and efficient.

Bottom elements of Quad at VK2SA. Note feed system across coil.

Tests were made with a constructed loop and a number of loading coils, and a coil of 10 turns on 1¼ inches diameter plastic tube was finally chosen. Reference might now be made to Figs. 2 and 3, giving full dimensions of the Quads which all dipped to 14 Mc.

The East/West Quad was erected on 2nd September 1968 and 300 ohm t.v. line was connected across the loading coils and both feeders terminated in the shack. The physical direction of the loops allow a radio directivity of either East or West and with the feeders terminated either into a "Z" match coupler or "Reflector Tuner" (coil and condenser) the direction of transmission can be aimed either East or West.

The system worked from the start. If it is desired to work in an **Easterly** direction, the **East** loop is connected to the transmitter "Z" coupler and the **West** loop is connected to the **Reflector Tuner**. Both the "Z" coupler and the **Reflector Tuner** are manipulated till the greatest amount of radio frequency energy is indicated in the **Reflector Tuner** by r.f. ammeter and pea lamp soup loop. This is a positive system and **virtually eliminates the use of the standing wave ratiometer.**

The front to back ratio of the Quad can be positively checked by firing up the antenna to receive in a westerly direction when the band is open to the **East.** Choose a good c.w. signal coming from **East,** then take a note of the "S" meter reading and then tune the **Reflector for minimum signal.** I have varied an S8 signal from the States to S4 with the Reflector Tuner. With the minimum signal you have the best possible front-to-back ratio obtainable with the antenna. After the above exercise you reverse the antenna to fire East and you are in business for American contacts.

The capabilities of the antenna were so good for DX contacts as to warrant consideration to the construction of a second Quad for North/South directivity and to add a little variation to the mythical dimensions laid down for Quads by the experts, a loop of 15 feet per side (Fig. 3) with coil 10 turns 1¼ inches diameter in the top horizontal section and a similar coil in the bottom section. This loop dipped at 14 Mc. An identical loop for reflector was also constructed and the antenna was hoisted at the bottom of the garden in such a direction to give North/South directivity.

To feed these two loops, it was necessary to run two feed lines consisting of 300 ohm t.v. open wire line a distance

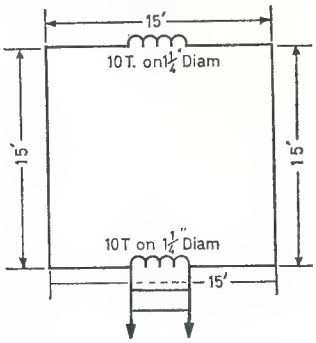


Fig.2 N/S Quad reflector same dimensions

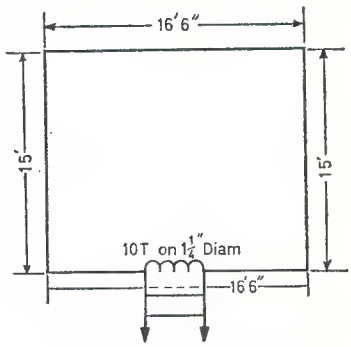


Fig.3 E/W Quad reflector same dimensions

of 84 feet from the shack to the antenna. This antenna was placed in operation on 24th September 1968, the first contact being my old friend, Bill VR2EK in Fiji at S8, followed by 9M2NF at S9 plus.

The critics might say that the loop planes are not parallel, but from the results obtained, it does not seem to matter greatly. The height of the top wires of all loops is about 35 feet.

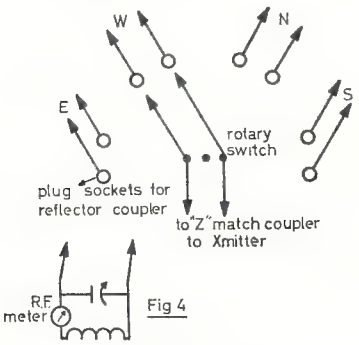
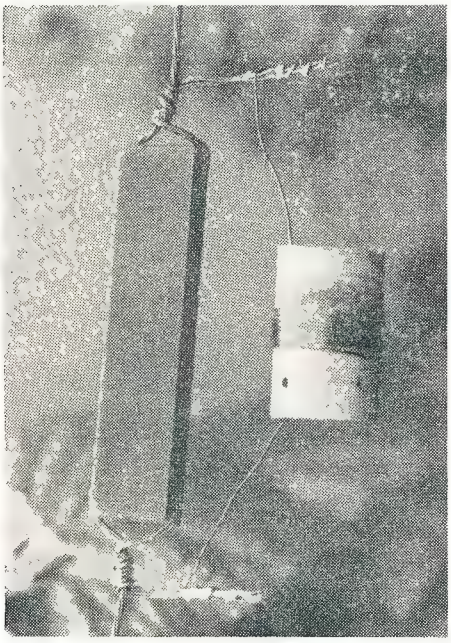


Fig 4

To switch in any one loop to the transmitter "Z" match, a four-position disposals 2-pole switch is used, labelled East - West - North - South (see Fig. 4) and assuming the South antenna is switched in, the Reflector Tuner is plugged into the North antenna feed line, thus giving South directivity.


Quad Coils. 10 turns on 1¼ inch diam.

Some observations might now be made on the loop loading coils (see photograph) and it will be noticed that the coil is soldered across an insulator, rather than being directly placed in the loop circuit. This is to eliminate any antenna strain on the coil former and for convenience in changing coils to permit variation of the resonance point as indicated on the g.d.o.

(Continued foot of next columns)

A MODIFICATION TO THE TRIO 9R59De RECEIVER

D. M. ROSENFIELD, VK3ZOP*

Having recently sold my only general coverage receiver, I proceeded to see what was available. The receiver I required was to be used basically as a tunable i.f. for my 6 and 2 metre converters, but had to have a few extras:

1. It should have a reasonable performance on 80-10 metres.
2. Oscillator and b.f.o. to be regulated.
3. Inclusion of a product detector.
4. Preferably to have a filter in the i.f., and last but not least,
5. Should be reasonably priced.

After considering what was available, I decided on the Trio 9R59De, which seems to fill my requirements except for one small fault.

Switching to the s.s.b.-c.w. position and setting the r.f. gain at maximum, it pulled the oscillator off frequency. Although s.s.b. is usually not received with the r.f. gain wound up, with the receiver in its original condition the r.f. gain control had to be turned back nearly half way to enable stable s.s.b.-c.w. reception, consequently weaker signals could not be heard.

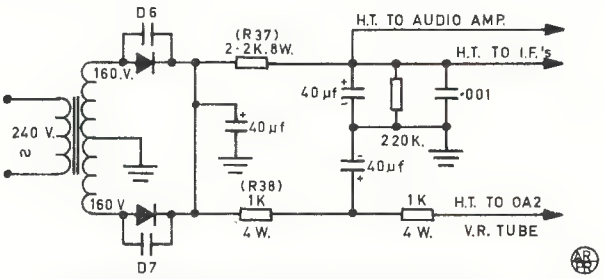
Having removed the bottom cover on the receiver, I measured the h.t. voltage and wound up the r.f. gain at the same time and noticed a drop in h.t. by nearly 50 volts. This was enough to pull the oscillator and b.f.o. off frequency, so I removed the 2.2K 8w. filter resistor and substituted it with a small filter choke, re-arranged the filter condensers and needless to say practically cured the fault.

The variation on the h.t. line is now only 10 volts, with the result that the r.f. gain can be set just below maximum without pulling the oscillator.

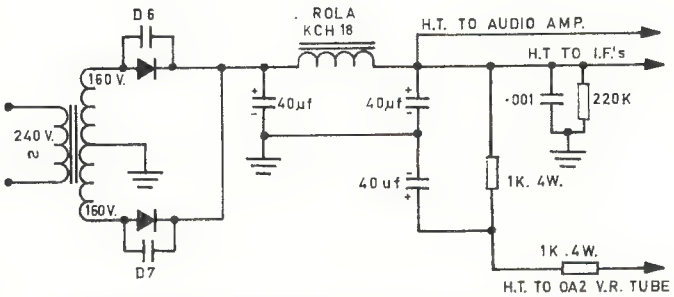
A noticeable decrease in hum level will result if the modification is carried out as shown on the accompanying circuit.

The filter choke can be fitted to the side of the receiver chassis, above the OA2 socket.

* 11a Marara Rd., South Caulfield, Vic., 3162.



ORIGINAL TR10 9R59de H.T. CIRCUIT.



MODIFIED TR10 9R59de H.T. CIRCUIT.

We now have four directions at the flick of a switch at VK2SA, and as for results, I submit the following statistics. Since 2nd September 1968 to 10th October 1968, a total of 438 overseas DX contacts have been made and of these 234 gave me from signal strength 7 to signal strength 9. Of the total contacts, about 50% were on c.w.

There is a first in everything and I close with the observation that I may be the only Ham in the world with two separate Quads in the backyard.

ECONOMY SPEECH COMPRESSOR

IAN J. HUNT, VK5QX/P*

The following circuit is one which has been used by the author for some time with quite exceptional results. Credit for the design must go to Howard VK5ZBE, who continually keeps prodding with yet more and more versions, both simpler and ranging to very elaborate. Following many requests over the air, I have finally got around to sending the details to "A.R."

The device depends upon the fact that the impedance of a diode varies according to the amount of current flowing through it.

The audio output from the simple transistorised amplifier is taken from the emitter of the second stage and fed to the transmitter speech input. From the collector of this second stage, some audio is rectified in a peak to peak detector, then filtered and fed to the base of the control transistor which has a diode in series with its emitter, connected across the amplifier input.

showed no appreciable reduction in output or distortion of the output waveform viewed on an oscilloscope.

Many on-the-air demonstrations have taken the form of speaking in a normal voice with the microphone, a high impedance dynamic type, at various distances ranging from 3 inches to 30 feet away in the next room. At the greater distances an echo effect is of course produced, but all reports indicate a lack of distortion and hardness so prevalent in many speech compression systems.

Various types of transistors can be used such as 2N3645 in the amplifier and AX8001 for control, however the control transistor should be of the type using the metal case and able to handle the necessary dissipation across the voltage rails.

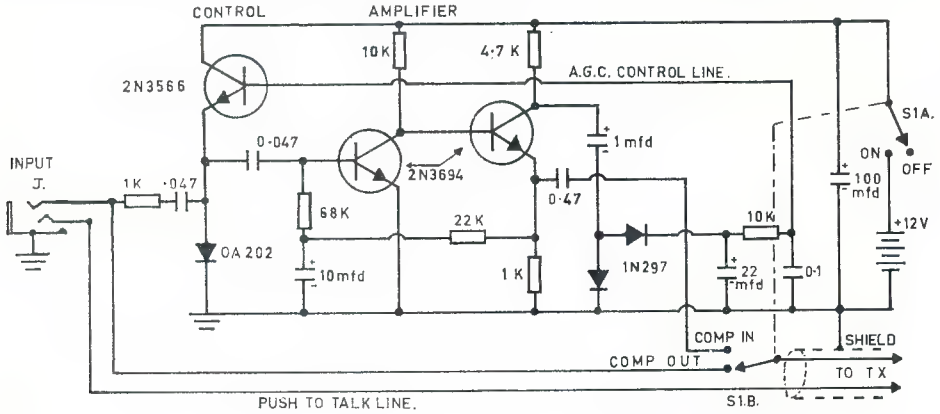
Layout is not critical, though the normal shielding required for transistors when large amounts of r.f. are

Another refinement envisaged is that of placing a small meter calibrated in db. in the control transistor collector lead so as to monitor the amount of compression in use.

Provision of an on/off warning light was considered unnecessary and would only serve to increase battery drain.

A small transistor radio battery has been in use for approximately nine months with no apparent sign of deterioration in performance and indeed a 9 volt battery providing only 8.5 volts on load produced quite worthwhile results.

So if while you are mobile in the hills and would like to get over the atmosphere of the whispering brooks and the trilling of the birds, go to it, and add one of these units to your equipment. It's also useful for people with quiet voices, when the family are asleep or when you want to add that extra punch for DX working. However, don't try it when using vox.



S1. 2-POLE 2-POSITION SWITCH.
J. RING, TIP & SLEEVE JACK RECEPTACLE

SPEECH COMPRESSOR

The higher the input signal, the greater the voltage supplied to the control transistor, and consequently the more current flows through the diode reducing its impedance and allowing it to act as an automatically variable attenuator across the amplifier. Conversely, the smaller the input level, the greater the overall gain of the system. A constant level output is thus obtained and has been measured as requiring a change of input level of 38 db. for a 3 db. change in output.

The attack time of the system is quite fast and whilst not ideal for handling transients of extremely short duration, is adequate for all normal speech use.

The additional gain in the unit provides some microphone preamplification which merely necessitates reducing the transmitter audio gain.

Frequency response is excellent and, although no exact measurement was done, sweeping the input oscillator used for testing from 100 cycles to 500 kc.

about should be employed. The unit was built into a small metal box, 5" x 3" x 1½", which allowed plenty of space for the phone jack, compressor on/off and in/out switch, plus battery and components mounted on matrix board.

The components were laid out on the board almost as shown in the circuit diagram. Resistors and capacitors of the smallest available physical size were used.

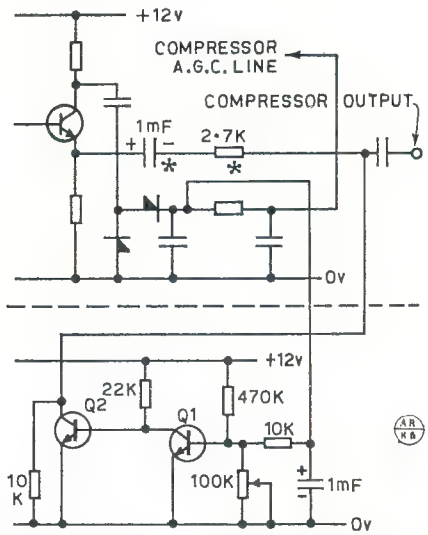
A problem involving some r.f. feedback was cured by providing a separate earth between the shielded braid of the output lead and the metal container besides connection to the 0v. rail.

The addition of a resistor/potentiometer and diode divider network across the supply allowed a set voltage to be applied to the base of the control transistor, switchable between the wiper of the potentiometer and the junction of the 10K ohm resistor and 0.1 uF. capacitor in the filter. Though this allowed a controlled condition of fixed gain, it was finally considered not worthwhile.

THRESHOLD CONTROL OF THE SPEECH COMPRESSOR

One disadvantage of the speech compressor previously described is that with it operating on low level signal any extraneous noises will be amplified equally, thus modulating the transmitter. It is definitely a disadvantage for the vox on a rig to trip on every time the operator moves in his chair to scratch his ear. The problem can, however, be solved by the addition of the simple two transistor control circuit shown. This allows the setting of a threshold level for voice, depending upon how close to the microphone or how loudly you wish to speak, while

(Continued on Page 15)



ABOVE DOTTED LINE IS ORIGINAL COMPRESSOR CIRCUITRY EXCEPT COMPONENTS MARKED * ADDED IN SERIES WITH OUTPUT LINE. Q1 & Q2 2N3641, 2N3643, 2N3694 etc. COMPONENTS USED SMALLEST PHYSICAL SIZE AVAILABLE.

COMPRESSOR THRESHOLD CONTROL

* C/o. P. Longhurst, 6 Northampton Cres., Elizabeth East, S.A., 5112.

IMPROVED F.M. OPERATION*

Proper Maintenance of Two-Way F.M. Equipment can improve Mobile QSOs

DAVID J. GOODMAN, WA8UIT

NOT everybody operating Amateur f.m. is in the two-way radio business. (It just seems that way!) It's well known that those who do work with mobile radio as a part of their job usually have enough knowledge of commercial two-way equipment to assure that their Amateur f.m. gear is in proper working order. But, what about those of us who never got closer to f.m. mobile equipment than the back seat of a taxi, until deciding to go Amateur f.m.?

The truth is that f.m. two-way equipment is pretty strange to a lot of fellows; even those who have been active Amateurs for years. The f.m. transmitters are generally easily understood, and being a comparatively simple device, they give the average Amateur little trouble. He can easily tell if he is getting the proper output, he can tune the transmitter, and in general, he knows what to do to make it work properly.

THE RECEIVER

Unfortunately, the f.m. receiver is another story. Comparatively few Amateurs have ever had much experience in critical receiver alignment, since no other popular Amateur operating mode requires the Amateur to understand his receiver and to have a fiddle as intimately with its total alignment as does f.m.

The result of this situation is a transmitter that works, a receiver that does not and an apologising operator. Time after time, the writer, along with other local stations, has responded to mobiles who were on their way through town, asking for a contact. Enough r.f. is heaped upon these fellows to cook a turkey, but alas, comes back the typical reply, "Sorry, Old Man, can't get your call there. We'll have to make it another time. Don't think this receiver is working quite right."

The answer to this situation is not difficult, if we consider how the receiver got sick in the first place. Most f.m. gear being operated by Amateurs today is obsolete commercially manufactured equipment that is between 10 and 20 years old. If it's mobile equipment, the chances are good that it has been in and out of perhaps as many as 15 different vehicles and has been worked on by scores of different people. It may have come directly out of service to the Amateur, or it might have been obtained from another Amateur who used it himself. In any case, since its ancestry and health history are unknown, the safest approach is pure skepticism.

"The equipment is presumed to be in as bad a condition as possible until proved otherwise," should be your motto. There is no reason to assume that those who worked on your unit left it in good order, even if it came right from commercial service, so you can be skeptical in that case, too.

We are going to discuss some of the steps to be taken to insure that a receiver is doing the job that it should be. The references are based on experiences with equipment for 2 metre f.m., but the techniques are directly applicable to 6 metre gear, as well.

TUBES

It's commonly known that close to 99% of the trouble in tube-type electronic equipment is the result of tube faults. The typical high band receiver has about 16 tubes, so it is mandatory to make sure that all the tubes are in satisfactory condition. This should be done before ever applying power for the first time. Test every tube in a dynamic mutual conductance tube tester. Test carefully for intermittent shorts and observe the emission level. Be critical. If a tube is marginal, shows a partial or solid short, or its emission falls off, throw it away. You might end up needing six or eight new tubes. If this shocks you, remember that our objective **is a receiver that works properly**. If you are going to replace tubes with spares from your junk box, test the spares, too. Be sure that all the tube types agree with the labels on the chassis for each socket. If a late-number tube has been substituted for the original, check to see that it is a compatible substitution.

THE RELAY

One thing that we are going to suspect right off the bat and are not even going to give a chance to prove its innocence is that nefarious malperformer, the antenna relay. This ghastly mechanical contrivance, ridiculously simple though it be, is subject to continuous use and because it carries respectable current and voltage, it arcs, pits, attracts dirt, gets tired physically, etc. Because it exists under these conditions, it very often ends up doing a pretty poor job of conducting r.f. in and out of your set, by the time you become owner. Receiving losses of up to 20 db., for example, due solely to antenna relay trouble, are not at all unusual.

To insure yourself against having later trouble with the relay, burnish the contacts carefully with a relay burnishing tool. If you don't have a tool, use white bond paper strips. Insert the paper between each contact and the transfer leaf, compress the leaf gently and work the paper in and out until no residue is visible when using a clean paper. Check the relay for correct overtravel in both the operated and unoperated positions. If necessary, adjust. Do this same cleaning and inspection job on the transmit-receive relay as well. This relay contains the receiver B+ continuity contacts and often contributes to low B+ as a result of poor conductivity in these contacts. (In some sets, the antenna and power switching is combined on one relay.)

TUNING AND ALIGNMENT

Next, we must make sure that the receiver front-end will really tune into the Amateur band. In the case of high-band equipment, many receivers will not tune down from their intended 150 Mc. range to 146 Mc. without modification. But the unsuspecting Amateur, observing what he thinks is a peak when adjusting the stages of the receiver which operate at channel frequency, is, in reality, seeing the drop-off as the slug passes out of the coil, **without ever reaching resonance**. This probably accounts for more sick receivers on 2 metre f.m. than any other single cause. A grip-dip meter check of each tuned circuit that operates at channel frequency will resolve your doubts on this issue. It's usually a simple matter to add 2 pF. or so of capacity across a coil externally, where needed, to bring the can down onto the Amateur band.

Precise alignment of the receiver is paramount for correct operation, and it is the next step. Correct alignment of commercial f.m. two-way receivers can be bothersome without having the benefit of proper test equipment, but it is possible. In receivers having a fixed low i.f. filter, the discriminator and the i.f. chain must be tuned with a precisely accurate signal source. The BC221 frequency meter, loosely coupled just ahead of the stage being adjusted, will do this job quite well. The BC221 is superior to most signal generators that the average Amateur may have at his disposal because of its accurate dial setting capabilities and its relative freedom from drift. The signal level can be kept below saturation by adjusting the coupling.

The same procedure can also be used for alignment of the high i.f. and the front-end of the receiver, even on 2 metres. A rough tuning of the front-end may first have to be made with a local transmitter serving as the signal source, in order to get an ample amount of signal. After this has been done, there should be sufficient sensitivity in a healthy high-band receiver to allow a harmonic from the BC221 (set at around 14.6 Mc.) to quiet the receiver when applied at the antenna input. For a final alignment of the front-end, the frequency setting of the BC221 should be adjusted to match the discriminator reading of a signal from a transmitter known to be on channel, and the front-end stages re-peaked.

POWER SUPPLY

If the receiver is to be used in a mobile installation, the power supply must be checked as the next step. Vibrators have disappointingly short lives, so we'll want to make sure that

* Reprinted from "CQ," July 1968.

the one that came in the set can be trusted. A partial test of its condition may be made by simply checking the receiver B+ with the correct battery input voltage applied to the power supply. If the resultant B+ is less than 95% of the specified value, an investigation should be made to find the cause. Vibrator replacement is the starting point, followed by filter capacitors and then rectifiers (if the vibrator is of the interrupter type).

PREAMPLIFIERS

Let's assume that your receiver has now passed all the tests and is as sensitive as the day it left the factory. Have you done everything you can to insure good reception? No; because the day your receiver left the factory was a long time ago, and a great deal of progress has been made in the-state-of-the-art since then. At the time your receiver was made (if it's high band) the classic first r.f. amplifier tube was the 6AK5. It's a reliable tube, but it suffers from having a high noise figure. That is, because of certain structural considerations, it continuously generates noise internally. So, while it is amplifying an incoming signal, it is also amplifying its internal noise. If the incoming signal is greater than the 6AK5's internal noise, it will be amplified and detected. But, if the tube's internal noise level is greater than the signal, the noise will mask the signal and you'll never know it was there. A 6AK5 has a noise figure of about 10. db., at 144 Mc.

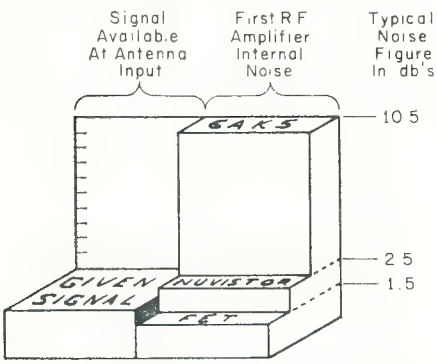


Fig. 1.—Relationship between the noise figure, receiver sensitivity and the various r.f. amplifiers discussed in the text.

In the 1950s, the introduction of the Nuvisitor was a big step in the development of low noise v.h.f. amplifiers. Nominal noise figures for Nuvistors are on the order of 2.5 db. But the last five years have really seen a breakthrough in v.h.f. amplifiers with the availability of a host of inexpensive bipolar and field effect transistors (FETs) having noise figures of around 1.5 db. at 144 Mc.

A look at Fig. 1 will help to understand the relationship between the noise figure of the first r.f. amplifier in a receiver, and it's sensitivity. In the pictured example, there is a given signal with strength greater than the internal noise level of an FET, but below that of the noise levels of both a Nuvistor and a 6AK5. In this case, we can expect the signal to be amplified and detected if the FET is serving as our first amplifier device, but it will never be heard if a Nuvistor or a 6AK5 is used. From this, it is easy to see the vast improvement in weak signal detection that can be obtained by substituting a low noise figure FET for a 6AK5 first r.f. amplifier.

The easiest way to make this substitution is to add an FET preamplifier between the antenna relay of your set and the antenna input jack on the receiver. The current literature is filled with simple FET preamp. circuits for 144 Mc. that you can easily build. Usually, a single transistor is all that is needed, as only enough gain to overcome the noise of the original first r.f. amplifier tube (most likely a 6AK5) is required; 15 to 18 db. ought to do it. If you are not a builder, such a preamp. can be purchased, ready to go, for around $12.

ANTENNA FEEDLINES

While of interest mainly to the operators of fixed stations, perhaps a word should be said about antenna feedline, as it affects the reception of signals. For the benefit of those v.h.f. f.m. newcomers who are refugees from the "low bands" (and there are more of these converts every day) it should be pointed out that feedline considerations that could be treated casually below 10 metres become absolutely critical at 146 Mc. The two most important of these factors are directly related; attenuation and length.

The two types of 50 ohm co-ax. that are best known to the Amateur are RG-8/U and RG-58/U. The published attenuation figures show that RG-8/U has a loss of 2.1 db. per 100 feet at 100 Mc., while RG-58/U has a loss of 4.2 db. under the same conditions. A lot of operators give these figures little attention and, because they have a length of RG-58/U around, or because it's cheaper, they use, say, 100 feet of it in their 2 metre feedline. Doing so means a loss equal to more than half the power. Even this fact doesn't seem to disturb some fellows too much, as they reason that they can always think up ways to boost the transmitter power to equalise this loss. What they fail to consider, however, is that the attenuation of the feedline will eat a 4.2 db. bite out of any signal being **received** by the antenna, before it ever gets to the receiver.

The 2.1 db. difference in attenuation between the two types of co-ax. is sufficient to make the difference between a readable and an unreadable signal, which, after all, is the ultimate test of desirability for any of the elements of the system. The lesson to be learned here is that when working at 100 Mc. and above, RG-58/U should never be used for runs of more than a few feet, such as for a feedline in a mobile installation or to interconnect pieces of equipment.

PREVENTIVE MAINTENANCE

So now you finally have a unit that receives properly and you are hearing all kinds of things you never knew were there. What's needed to keep it that way? Something called "preventive maintenance".

The technique of routine testing and inspection of electronic gear to prevent gradual performance fall-off (as well as to forestall disruptive failures) has been the accepted doctrine of all commercial and military communications organisations for decades. But for some reason, the Amateur laughs at the idea of this being applied to his equipment. For those Amateurs who would rather trouble-shoot than operate, this may be an understandable attitude. If you so desire, however, you can go a long way towards keeping your f.m. equipment in good condition simply by testing all tubes at least once every six months and keeping the relay contacts clean. Remember that if you replace a tube in a tuned stage in the receiver, you will have to re-peak that stage.

This service routine is especially important in an area where a repeater station is used. Because of a favorable transmitter site and/or high power, the area is blanketed with the repeater's signal and the local operators tend to get lazy about the condition of their sets. Should the repeater fail and simplex communication be attempted, the results would be disappointing, to say the least.

Or, if a mobile from an area that has a repeater takes a trip through territory where stations operate simplex, he may get the mistaken impression that there is very little activity there.

The personal opinion of the writer is that the case for repeater stations (in other than mountainous terrain) is often overstated. Direct mobile to mobile communications with reliability good enough for Amateur Radio is possible over surprising distances when all equipment is functioning properly.

Well, there you have it. With a little understanding and proper care, commercial f.m. two-way equipment will give an Amateur years of satisfactory performance. The terrific rate of growth of this mode of operation is a good indication of the enjoyment to be had from its use. A correctly functioning receiver is the key to that potential.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

PROVISIONAL SUNSPOT NUMBERS

OCTOBER 1968

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	75	16	88
2	73	17	82
3	108	18	108
4	119	19	121
5	118	20	114
6	126	21	122
7	135	22	134
8	112	23	136
9	87	24	139
10	70	25	138
11	103	26	133
12	108	27	138
13	70	28	118
14	76	29	112
15	90	30	118
		31	99

Mean equals 108.7.

Smoothed Mean for April 1968: 107.4.

—Swiss Federal Observatory, Zurich.

S.S.B. Transmitter—An Amateur Engineering Project

Some Notes and Comments from the Author

In the two years which have elapsed since this project was first committed to paper, and finally published, further experiments were made which make certain alterations to the article desirable to bring it up to date. These are listed below.

Part One

Page 6, col. 1, § 5: "power point amateur."

Page 6, col. 3, § 2: delete "and new call signs".

Page 7, col. 1, photo: Exciter—four tuned circuits are now used in the i.m. (two only shown on the older picture).

Page 10, col. 2, § 3: The second mixer with a 12AT7 oscillator . . . The other half of the 12AT7 acts as buffer for the c.o. Block diagram: 6AM6 and 6AK5 now 12AT7.

Page 10, col. 3, §2: The c.o. is now in the v.f.o. box.

Part Two

Page 6, col. 2, compressor circuit: Add a 2 uF. electrolytic capacitor at the junction of the plus lead of the right hand side Ge-diode and the 100k ohm resistor, and ground (to increase a.g.c. decay time).

Page 6, col. 3, § 2: "picked up **by** the mike . . ."

Page 7, col. 2, v.f.o. circuit: 20 pF., N3300 TCc capacitor.

Page 8, col. 3, § 2: Ge-diodes are now again in use at 0.35v. r.f. (fan cooled rig). The high capacity of the Si-diodes made carrier null adjustment very voltage sensitive.

Page 9, col. 2, § 3: Replace "40 db." by allowed the usually used—20 db. carrier suppression—and to match low a.f. response to op's voice and the finally used mike.

Page 9, col. 2, second last §: Replace "double" by: four tuned circuits, to achieve 60 db. suppression of the v.f.o.-image signal at 414 kc. plus the operating frequency (see Part 1, page 9, Table C) otherwise appearing in the tx output. This circuit has 50 kc. bandwidth.

Page 9, col. 3, v.f.o. sub-title: Half the chassis is occupied by the c.o.

Part Three

Page 11, col. 1, end of § 3: It was similar later so with the c.o. in the v.f.o. box.

Page 11, col. 2, § 1: A 6AM6 triode connected was first employed. A 12AT7 is now used.

Page 11, col. 2, § 4: Delete from "grid stopper . . ." The 12BY7 is stable, but the 6BQ5 had to be neutralised in the usual manner.

Part Four

Page 10, col. 2, § 2: Replace first sentence with "Some r.f. is getting into the receiver via stray capacity at the aerial relay, and the v.f.o. . . ."

Page 10, col. 3, last §: Replace first sentence with "Experiments with different microphones showed that they should not produce spikes at certain voice frequencies to prevent over-modulation, or only a low average drive level can be used. Playing back . . ."

Page 11, col. 1: Exchange number 8 and 9 on literature reference.

—H. F. Ruckert, VK2AOU.

— . . . —

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

CONVERSION OF VALVE CIRCUITRY TO SEMICONDUCTOR TECHNIQUES

Editor "A.R.," Dear Sir,

I wish to thank you for printing the two articles on conversion of valve circuitry to semiconductor techniques ("A.R.," June 1968).

Following publication of these articles, I set to work converting a conventional amplitude modulated "taxi set" using the basic circuitry described.

A number of problems were experienced and the final product bears little resemblance to the original complete circuit.

The results, however, more than justify the effort expended. The receiver sensitivity is better than any other I have ever built. As a portable, the reduction in power consumption is listed for the benefit of others who may be interested.

Readers may also be interested in another article printed in "Electronic Engineering" for August 1967 entitled "Amplifiers Combining Bipolar and Field Effect Transistors," by W. Gosling. This article discussed some of the theoretical considerations beyond the scope of the articles printed in "A.R."

A.m. transceiver power consumption (battery current measured at 14v. d.c.)—

	Original Valve Set	As Converted
"Receive only"	1¾ amps.	25 mA.
"Stand-by"	4 ,,	1¼ amps.
"Transmit"	8 ,,	5 ,,

I hope that this letter will encourage others to further efforts.

My interests are now to be devoted to the construction of a 3-watt a.m. transmitter using BFY50 transistors. Information and assistance in the form of reports from other workers in this field would be appreciated.

Perhaps "A.R." may be considering a reprint along these lines?

—Max Riley, VK2ARZ.

SUBSCRIPTIONS DUE

All members of the W.I.A. are reminded that annual subscriptions are now due and should be paid promptly to their Divisional Secretary. Non financial members will not receive a copy of "A.R.," and back copies may not be available upon request. To preserve continuity of your files of "A.R.," please pay your annual subscription now.

ECONOMY SPEECH COMPRESSOR

(Continued from Page 12)

with the control potentiometer wound right out, maximum sensitivity can be provided if so desired. The ability of the compressor to lift the overall audio level is not impaired and vox can quite readily be used.

Operation of the circuit is as follows: Assume first a "no signal" condition from the compressor. Without a voltage being derived from the compressor a.g.c. system, no base current will flow in Q1 and therefore that transistor is cut off, i.e. its collector is "up" at positive rail potential. Its collector is common with the base of Q2 which causes that transistor to turn hard on (+12v. applied to base), the collector of Q2 therefore being "down," or at earth potential, effectively shorting the compressor output to earth.

This condition will remain until such time as an input signal to the compressor produces enough a.g.c. voltage to switch transistor Q1 "on". The level at which this occurs depends on the network consisting of the 470K resistor and 100K potentiometer across the base of Q1 and of course can be varied by adjustment of the potentiometer.

When Q1 is turned on its collector is "down" at earth potential, thus causing Q2 to turn off, as its base is commoned with Q1 collector and the full supply voltage is dropped across the 22K resistor. The output signal from the compressor is thus allowed to pass through as Q2 collector is therefore above earth by a value of 10K ohms.

Almost any silicon NPN transistor can be used. In the circuit shown a type 2N3641 was used. Layout is not critical, and little space is required. This control circuitry can be included on the same piece of matrix board on which the compressor is built,, with the potentiometer mounted on the front of the box. This circuit has been found to be very effective, no trouble to get going and an extremely worthwhile addition to incorporate. If you then wish to scratch your ear, just move the microphone a little further away while you perform this function. With the threshold control set correctly no such noises will be transmitted.

— . . . —

INTERNATIONAL SP DX CONTEST 1969

PRECIS OF RULES

Date: 1500 GMT, 5th April, to 2400 GMT, 6th April.

Bands/Mode: 3.5 through 28 Mc.—c.w. only.

Contest Call: Call "CQ SP".

Cyphers: The usual six-digit number incorporating RST, e.g. 599001, 589002, etc. Polish stations will send RST plus two letters denoting their powiat.

Points: Three points per SP station. The same station may be contacted on other bands.

Total score: QSO points multiplied by number of powiats contacted.

Awards: A certificate to the highest scorer in each country.

Logs: Keep a separate log for each band. Log all times in GMT. Submit the usual summary sheet listing scoring information, name and address, and including a signed declaration that all rules have been observed.

Send to, before May 1969: Contest Manager PZK, P.O. Box 320, Warsaw 1, Poland. Endorse "SPDX Contest".

NEW CALL SIGNS

OCTOBER 1968

VK2FJ—N. K. Shaw, 22 River Rd., Oatley, 2223.
VK2GP—G. T. Pile, 52 Clement St., Forbes, 2871.
VK2WX—J. Pollock, 15 Matthew Pde., Blaxland, 2774.
VK2ABG—G. R. Hughes, 33 Smith St., Manly, 2095.
VK2ACY—C. J. McCarthy, 37 Iris St., Frenchs Forest, 2086.
VK2ALI—P. G. Dale, 196 Beecroft Rd., Cheltenham, 2119.
VK2AMT—B. M. Thomas, 10 Bentley Ave., Forestville, 2087.
VK2AXW—W. H. W. Shand, 10 Chilton Pde., Warawee, 2074.
VK2BFI—J. Ginsberg, Oriental Hotel, Cooks Hill, Newcastle, 2300.
VK2BJR—B. J. O'Rielly, 41 Elizabeth St., Goulburn, 2588.
VK2BJT—I. S. Miller, 77 Rae Cres., Kotara South, 2288.
VK2BOM—R. J. Mitchell, 43 White St., Wagga Wagga, 2650.
VK2BWB—W. B. Pollock, 18 Watkin St., Hurlstone Park, 2193.
VK2BWD—Westmead Radio Club, 10 Helen St., Westmead, 2145.
VK2BXF—D. S. Roden, 4/257 Blaxland Rd., Ryde, 2112.
VK2ZHO—H. F. Padberg, 7 Pitnacree Rd., East Maitland, 2323.
VK2ZNI—N. A. Jefferey, Christian Brothers' School, Wagga Wagga, 2650.
VK2ZTN—R. A. Armstrong, 76 Denman Pde., Normanhurst, 2076.
VK2ZVV/T—V. G. Barker, 7 Short St., Carlton, 2218.
VK2ZWE—H. W. Spaulding, 7 Spring St., Abbotsford, 2046.
VK2ZXR—R. E. Anderson, 32 Oak Rd., Kirrawee, 2232.
VK3CH—A. G. Nunn, 10 Arcady Gr., Vermont, 3133.
VK3GG—E. Chick, 15 Vida St., Essendon, 3040.
VK3MK—J. D. Lundy, 90 Dalny Rd., Murrumbeena, 3163.
VK3OE—E. M. Planck, 62 Evesham Rd., Cheltenham, 3192.
VK3OQ—J. F. Dalstead, 8 Joami St., Cheltenham, 3192.
VK3YY—G. P. J. Clarke, 17 Gladstone Ave., Armadale, 3141.
VK3ADO—D. Glegg, 1 Tennyson Ave., Kilsyth, 3137.
VK3AGJ—L. N. Hocking, 7 Noonan St., Benalla, 3672.
VK3AIZ—L. Zschech, "Parkside," Hamilton, 3300.
VK3ANV—R. G. Gordon, Hopetoun St., Lockington, 3563.
VK3ANY—J. A. B. Wallick, 5 Fenwick St., Kew, 3101.
VK3AQO—D. T. Bellair, 1 Mossman Dr., Heidelberg, 3084.
VK3AQQ—J. W. V. Storey, Zig Zag Rd., Eltham, 3095.
VK3AQS—P. P. Seitz, 1 Freeman St., Yarraville, 3013.
VK3AUQ—F. D. Baarda, "Glenaulin," Sherbrook, 3789.
VK3AUR—R. K. N. Wilkins, 118 Mont Albert Rd., Canterbury, 3126.
VK3AUU—D. P. Tanner, Lye & Nixon Rds., Ripplebrook, 3818.
VK3AVZ—G. A. Trotter, 6 Morrison St., Wodonga, 3690.
VK3AYG—H. A. Alcorn, "Pine Ridge," Donvale, 3111.
VK3AXO—R. G. O. Wilson, 45 Pleasant Rd., Hawthorn East, 3123.
VK3ZGZ—J. E. Carter, 434 Como Pde., Mordialloc, 3195.
VK3ZPS—P. J. Armstrong, 24 Paschal St., Moorabbin, 3189.
VK3ZXB—R. P. Vise, 11 Mossman Dr., Heidelberg, 3084.
VK4AR—G. T. Ryan, 95 Railway Pde., Norman Park, 4170.
VK4HM—Cairns Amateur Radio Club, Station: Monro Park, Cairns, 4870; Postal: C/o. L. Olsen, 7 Parramatta St., Cairns, 4870.
VK4IC—B. Gibbs, 236 Vulture St., South Brisbane, 4101.
VK4LC—L. C. Raebel, Station: Alpine Tce., Mt. Tamborine, 4272; Postal: P.O. Box 282, North Tamborine, 4272.
VK4QQ—C. R. Rutson, 43 Oxford St., Paddington, 4064.
VK4US—P. L. Hubsher, Station: 24 Broad St., Labrador, 4215; Postal: 51 Real St., Annerley, 4103.
VK5GU—G. B. Hunt, 29 Park St., Woodville, 5011.
VK5IN—K. V. Hanson, 5 Foley St., Salisbury Downs, 5108.
VK5XI—B. Hannaford, 38 Wright St., Peterborough, 5422.
VK5ZGG/T—G. F. Gilbert, 24 Benjamin St., Manningham, 5086.
VK6CT—C. D. D. Todd, P.O. Box 376, Carnarvon, 6701.
VK6TS—Carnarvon Amateur Radio Club, C/o. A.W.A., P.O. Box 348, Carnarvon, 6701.
VK6ZBT—G. Taylor, 233 Preston Pt. Rd., Bicton, 6157.
VK6ZDY—P. L. Jackson, 60 Anzac Tce., Bassendean, 6054.
VK6ZEE—T. J. Regan, 79 Station St., Cannington, 6107.
VK6ZEO—G. C. Mullett, 13 Rothbury Rd., Embleton, 6062.
VK6ZGE—G. A. Koziol, C/o. P.W.D. Elect. Dept., Kununurra, 6743.
VK6ZGD—G. P. Clifton, 13 Morley Dr., Morley, 6062.
VK6ZGT—A. E. Trappitt, P.O. Box 37, Borden, 6338.
VK6ZGY—P. M. Crane, 36 Lena St., Tuart Hill, 6060.
VK7BX—M. C. Hooper, 182 Melville St., Hobart, 7000.
VK7HW—H. H. E. Westerhof, Flat 2, 57 King St., Sandy Bay, 7005.
VK7KJ—G. C. Johnston, 23 Cottesloe St., Lindisfarne, 7015.
VK7PS—H. P. Schulz, 519 Nelson Rd., Mt. Nelson, 7007.
VK7ZX—T. J. Cox, 108 Hampden Rd., Hobart, 7000.
VK7ZBM—B. W. Marriott, 41 Garden Rd., Moonah, 7009.
VK7ZJH—J. L. Hursey, 38 Addison St., Rosetta, 7010.
VK9LM—L. Meck, Station: McWilliam St., Goroka, N.G.; Postal: C/o. A.W.A. Ltd., P.O. Box 9, Goroka, N.G.
VK9RA—R. H. Ashley, Christmas Island, Indian Ocean.
VK0KB—K. E. Beman, Mawson, Antarctica.
VK0MI—W. J. Grudgfield, Macquarie Island, Antarctica.
VK0RM—R. W. McLean, Davis Base, Antarctica.

CANCELLATIONS

VK1UN—J. A. Robb. Transferred to Vic.
VK2AAQ—C. Churm. Transferred to Qld.
VK2AYA—G. A. Ahlstrom. Deceased.
VK2BLN—L. L. Neaverson. Not renewed.
VK2ZFG—G. T. Pile. Now VK2GP.
VK2ZHI—J. Pollock. Now VK2WX.
VK2ZIS—I. S. Miller. Now VK2BJT.
VK2ZNX—N. K. Shaw. Now VK2FJ.
VK2ZSF—W. H. W. Shand. Now VK2AXW.
VK2ZXB—P. R. Cearns. Transferred to W.A.
VK3AFL—D. A. Page. Not renewed.
VK3ASM—R. E. Glew. Not renewed.
VK3AZG—B. Gardiner. Transferred to N.T.
VK3ZDN—R. M. Macrae. Not renewed.
VK3ZEU—E. M. Planck. Now VK3OE.
VK3ZFB—D. T. Bellair. Now VK3AQO.
VK3ZKW—I. J. Battersby. Not renewed.
VK3ZKY—R. G. O. Wilson. Now VK3AXO.
VK3ZLQ—J. D. Lundy. Now VK3MK.
VK3ZPP—R. G. Gordon. Now VK3ANV.
VK3ZPX—R. K. N. Wilkins. Now VK3AUR.
VK3ZTA—L. Zschech. Now VK3AIZ.
VK3ZXG—J. W. V. Storey. Now VK3AQQ.
VK3ZYH—L. N. Hocking. Now VK3AGJ.
VK4CS—4 Signal Regiment Amateur Radio Club. Ceased operation.
VK4ED—E. B. Dearing (Jr.), Not renewed.
VK4HX—D. S. Roden. Now VK2BXF.
VK4ZGT—G. T. Ryan. Now VK4AR.
VK4ZJL—J. T. F. Linde. Not renewed.
VK5XJ—C. A. Pryzibilla. Ceased operation.
VK5ZCH—K. V. Hanson. Now VK5IN.
VK6AG—W. E. Coxon. Deceased.
VK6CZ—G. R. Potter. Ceased operation.
VK6KE—K. J. Echberg. Transferred to Vic.
VK6RP—R. S. Trew. Deceased.
VK7KW—K. St. C. White. Deceased.
VK7ZHW—H. H. E. Westerhof. Now VK7HW.
VK7ZKJ—G. C. Johnston. Now VK7KJ.
VK7ZMC—M. C. Hooper. Now VK7BX.
VK7ZPS—H. P. S. Schulz. Now VK7PS.
VK7ZTM—T. J. Cox. Now VK7ZX.
VK8XI—B. Hannaford. Now VK5XI.
VK9ZCQ—J. A. McLachlan. Transferred to S.A.
VK9ZRA—R. H. Ashley. Now VK9RA.

☆

TECHNICAL CORRESPONDENCE

Erratum and Additional Notes on "Putting the Geloso G222 on 160 Mx"

Editor "A.R.," Dear Sir,

In reference to the article, "Putting the Geloso G222 on 160 Metres," please note the following error. The first line in paragraph 2, column 3, page 11, should read: "The new oscillator coil for 1.75 Mc. was wound on a fairly large diameter former, and after some experiment, **without** a slug . . ." Not "with a slug".

I would also like to include the following two notes:

1. The numbering of the bands 1 to 6 is the opposite way round to that used by the makers.

2. Modifications to the v.f.o. only refer to type 4/104.

—J. A. Adcock.

DURALUMIN, ALUMINIUM ALLOY TUBING

IDEAL FOR BEAM AERIALS AND T.V.

★ LIGHT ★ STRONG ★ NON-CORROSIVE

STOCKS NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL DIAMETERS—¼" TO 3"

Price List on Request

STOCKISTS OF SHEETS—ALL SIZES AND GAUGES

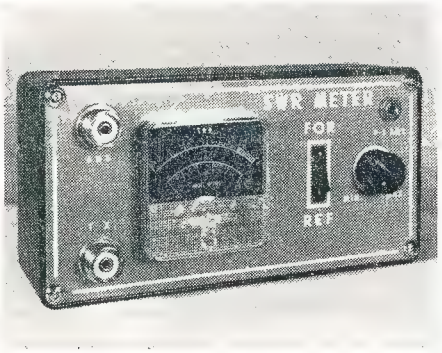
GUNNERSEN ALLEN METALS PTY. LTD.

SALMON STREET,
PORT MELBOURNE, VIC.
Phone: 64-3351 (10 lines)
Telegrams: "Metals," Melb.

HANSON ROAD,
WINGFIELD, S.A.
Phone: 45-6021 (4 lines)
Telegrams: "Metals," Adel.

New Equipment

S.W.R. METER



The "Rapar" Standing Wave Ratio Meter is available in two models, SE405-A for 52 ohm impedance, and SE405-B for 75 ohm impedance operation, from 1-150 Mc. at 500 mW. to 2 kW. p.e.p.

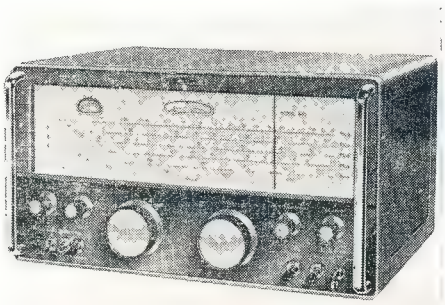
Specifications—

Frequency range: 1-150 Mc.
Insertion loss: < 0.2 db.
Detectable S.W.R.: From 1:1 to 1.10.
Impedance: Either 52 or 75 ohms (two models).

Price of either model: $18.50 plus 15% sales tax where applicable.

Further details from Radio Parts Pty. Ltd., 562 Spencer St., Melbourne, Vic., 3000, and City and East Malvern branches.

H.F. COMM. RECEIVER



The Eddystone "940" is a general purpose Communications Receiver covering from 480 Kc. to 30 Mc. in five overlapping ranges. It is suitable for reception of c.w., a.m. and s.s.b. signals, and by reason of the two r.f. and two i.f. stages incorporated, a high performance is obtained throughout the frequency ranges. Built-in power supply unit permits direct operation from a.c. supply of 110/125 and 200/240 volts, 40/60 cycles.

Available ex stock $424 plus 25% sales tax. Duty free ex bond store, government departments. Further information and brochure from sole Australian agents: R. H. Cunningham Pty. Ltd., 608 Collins St., Melbourne, Vic., 3000. Telephone 61-2464.

VERSATILE CONNECTORS

Painton (Australia) Pty. Ltd. have released a range of "Multicon" connectors with many improved features for multi-circuit connections and rapid linking of equipment. The full "Multicon" range consists of 2, 4, 6, 8, 10, 12, 18, 24 and 33-pole sizes and there is a complete selection of plugs and sockets with alternative mounting arrangements, cable fixings and retaining devices.

The Painton "Multicon" range is finished in silver-grey hammertone and basically interchangeable with the Painton "Standard" range plugs and sockets with the exception of the 6-pole size and 10-in-line unitor. A technical brochure setting out design data with illustrations is available on request. Inquiries to Painton (Aust.) Pty. Ltd., 29 Railway Ave., Huntingdale, Vic., 3166.

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YAESU MUSEN EQUIPMENT AND THE AUSTRALIAN MARKET

We have received a letter from Mr. S. Hasegawa, President of Yaesu Musen Co. Ltd., in which, amongst other things, he expresses his fear that Australian Amateurs may be confused regarding true information about his Company's products. He refers to an advertisement which appeared in "A.R." earlier this year, where-in it was indicated that certain equipment would be available in kit form.

Mr. Hasegawa stresses that they have not planned, nor do they intend to schedule in the future, kit sets of their equipment.

Mr. Hasegawa goes on to state that Bail Electronic Services have been their exclusive agents since 1965, and Yaesu Musen equipment purchased from other distributors does not carry the manufacturer's warranty, and spare parts could be difficult to obtain.

"Amateur Radio" accepted the advertisement under discussion in good faith. We realise that the fact that although any manufacturer may appoint an exclusive agent in an area, this does not preclude somebody else from seeking another source of supply either in the country of manufacture or through one of the free ports such as Hong Kong.

We have no intention of entering any controversy over this matter, as every prospective purchaser is free to select his own supplier.

Technical Data

COMPONENTS CATALOGUE

An electronic components stock catalogue for 1969 is now available from Soanar Electronics Pty. Ltd. Loose-leaf bound, the catalogue contains specifications of a range of Elna capacitors. both electrolytic and polyester film types, carbon potentiometers, and other devices. Requests for catalogues should be made to Mr. G. Soanes, Soanar Electronics Pty. Ltd., 42-46 Lexton Rd., Box Hill, Vic., 3128.

ANTENNA BROCHURE

The latest antenna brochure from Hy-Gain Electronics Corporation, U.S.A., features a range of communications types for h.f. and v.h.f. Amateur bands. The brochure contains 20 pages of illustrated technical information for base station and mobile antennas from 80 metres down to 2 metres, and includes the Hy-Gain model 14AVQ (40-10 metres), and the model 12AVQ (10-15 and 20 metres). Australian agents, Bail Electronic Services, 60 Shannon St., Box Hill North, Vic., 3129, will be pleased to meet all requests for copies.

FAIRCHILD "PLANAR" 1969

The Fairchild "Planar" for January 1969 gives details of the uA723, a second generation linear I.C., which incorporates on the one chip a temperature-compensated reference amplifier, an error amplifier, a power transistor, and current-limiting circuitry. It can be used as a series regulator, switching regulator, shunt regulator, floating high voltage regulator, or as a regulated current source, and for both positive and negative supplies. Further details from: Fairchild Australia Pty. Ltd., P.O. Box, Croydon, Vic., 3136.

☆

HIGGINBOTHAM AWARD

The Higginbotham Award for 1968/1969 was considered by the Publications Committee at its March meeting. It was unanimously agreed that the award go to Rodney Champness, VK3UG, as a token of our appreciation for his support and assistance to the magazine over a long period of time. Our congratulations to Rodney.

☆

CERTIFICATE HUNTERS' CLUB

During 1968 many C.H.C. Chapters were established in countries throughout the world and membership has dramatically increased.

New Zealand already has a fast growing Chapter, putting Oceania on the C.H.C. map. Let us do likewise. Form a Chapter and help encourage the world to work VK—and benefit ourselves at the same time. Six or seven members only are required from as many States as possible to set up the initial framework. So how about it chaps? Please write to VK4SS or K6BX, 3212 Mesa Verde Rd., Bonita, California.

—VK4SS.

P.S.—If you have been collecting awards you may be eligible for membership. Enquiries to QRA above.

DX

Sub-Editor: PETER NESBIT, VK3APN
32 The Grange, East Malvern, Vic., 3145

(All times in GMT)

ASSORTED

Gus W4BPD is now well under way with his DX-pedition. He operated from 6W8XX during February, then continued his way across Africa. Around the beginning of April he hopes to meet up with Steve VQ8CC, and as soon as transport is available they will leave for Rodriguez and St. Brandon Islands. At Rodriguez they will be operating from the Mt. Venus cable station where five 70 ft. towers are available with a good selection of antennas for all-band operation. (Date of arrival here will be April 12-17 sometime.) Gus would also like to visit Blenheim and Geyser Reefs, and when Steve returns to Mauritius at the end of his vacation, Gus will proceed to VQ9 where he will join forces with Harvey VQ9V. At this moment Gus has no definite plans after the Indian Ocean, but he does hope to visit Heard Island if possible and then head for Bhutan. His gear uses two v.f.o's on all six bands for split frequency operation. Frequencies used are: c.w. 1827 (or as per sked), 3525, 7025, 14025, 21025, 28025; s.s.b. 3795, 7095, 14195, 21245, 21395, 28495 and 28605. Will QSY if there is QRM. QSLs via W4ECI.

ZS1AMB and ZS1ANT will be operating from Antarctica for about one year. QSLs, which may be sent via the ZS Bureau, will be dealt with by the operators on their return home. Skeds may be arranged via ZS5ZS.

IZ6KDB: Anyone short of a QSL for John's WPX operation from Ponziane Island last May, may send another card to I1KDB at his call book address.

Gavin VK3AEJ, who recently operated from Willis Island as VK4EV, has just commenced sending cards out. He has about 1,400 QSLs to reply to, so just be patient; he hopes to have the majority done within a month or two. QSL will be 100 per cent.

Frank DL7FT is planning a DX-pedition to Monaco from 3rd to 10th April 1969, using the call 3A2CU. The frequencies used will be: 3795, 7065, 14195, 14245, 21295 and 28545.

Over 7,000 QSOs were made during the Chatham Isl. activity of ZL2AFZ/C, 1DS/C, 1IL/C and ITU/C. QSL activity is now at a peak with George averaging nine hours per day on QSLs. For those who still need this island, ZL3ABJ/C is active most evenings on 80. His tour of duty will be until mid-year.

Excepting Fridays and Sundays, ZS3AW (ex DJ2KR) skeds DL9OH on 14158 at 19 GMT daily, then shifts to 40/80 mx. Jurgen is there until May, but is not permitted to make long QSOs, so please just RS/RST exchange .

Belgian stations operating from exhibitions are required to sign their calls /F. It does not mean that they are in France as some have erroneously assumed.

To make identification easier in the future, stations on Auckland and Campbell Islands will sign ZL/A, on Chatham Island ZL/C, and on Kermadec Island ZL/K.

A reader recently drew attention to the fact that the prefix A was reserved for U.S.A. and is in use by a number of military and semi-military stations, and that the Botswana prefix A2 was "non-official". The latest information to hand (from several different sources) indicates that A2 was allocated to Botswana by the I.T.U., and therefore would be quite "official".

While on the subject of prefix anomalies, there are plenty around if one cares to look. Apart from Amateur prefixes (such as AC, which definitely does overlap the U.S. allocation AA-AL), others are easily found. E.g. the Victorian airport stations ML and LAV should theoretically be in the U.K. and Norway respectively. (Enough said.)

GC8HT will be QRV 1st April 7013 at 18 GMT; 7th April 14013 at 0730 GMT; 14213 at 09 GMT; 10th April, 14113 at 14 GMT; and 14th April 21013 at 0730 GMT.

QSL MANAGERS

FG7TC—Box 521, Guadeloupe.

FL8HM—B.P. 215, Djibouti, T.F.A.I.

FL8MB—B.P. 49, Djibouti, T.F.A.I.

FO8CG—E. Ermiz, Otepa, Hao Isl., Archipel des Tuamoto, French Polynesia.

FR7ZC—P. Ferrand, Sainte Suzanne, Reunion Isl.

KH6GLU—Box 762, Kaunakakai, Hawaii, 96748.

KV4CI—Direct only. H. Miller, Box 1853, St. Thomas, Virgin Is.

LG5LG—Three IRCs; via LA Bureau.

ON6AF—via ON4TJ, 43H Conscience Straat, Merelbeke, Belgium.

PY0OK, PY0OM—via PY2SO: Box 97, Sao Paulo, S.P., Brazil.

TY6ATE—B.P. 107, Natitingou, Dahomey.

VK0WR—U.S.C.G. Cutter "South Wind," F.P.O., N.Y.C., N.Y., 09501.

W2CTN—J. Cummings, 159 Ketcham Ave., Amityville, N.Y.

YA1ZC Box 638, Kabul, Afghanistan.

7G1CG—Box 33, Conakry, Rep. of Guinea.

9G1GL—Box 625, Toma, Ghana.

CR3KD—W2CTN.
CR5SP—W2GHK.
FG7XX—W2CTN.
FK8BG—W5IXQ.
FW8DY—KH6GLU.
HK0TU—HK3RQ.
PJ7VL—W2CTN.
PY0EP—PY1MB.
SV0WCC—WA0HPU.
VK2BPO/9—W4WS.
VK2BRJ/9—W4WS.
VP2AW—W9FIU.
VP2DAP—KV4AM.
VP2DAQ—K7TMK.
VP2DAR—W7PHO.
VP2MK—W8EWS.
VP7NF—VE1ASJ.
VS5PH—DL3RK.
YS1XEE—WB4BOJ.
ZF1JF—W1IIM.
5H3LV—VE3ODX.
5W1AS—KH6GLU.
9Q5HT—DL5WB.
9Y4PHO—W7PHO.

ACTIVITIES

A reliable contributor to the column, George Allen, L6042, sent in a run-down on his 160 metre listening activities: On two separate dates, VE3QU was heard on 1806 at 12 GMT. During the "CQ" W.W. 160 Contest, the following were heard: W7DL/7, W6JTB, W6QHQ, 79ACI, W9PNE and JAs 1HXE, 2CLI and 3UI. Later on at 2132 GMT, the band opened to Europe for 11 minutes and DL9KRA was heard working Gs and GI—his serial number at that stage was 183, so he was doing a pretty good job. An OK1 was also heard, but the band closed before he could be identified. (Thanks, George—Peter.)

No other actiivty reports were received this month.

RULES FOR THE WPX AWARD

(Worked All Prefixes)

To obtain this award it is necessary to receive confirmation of contacts with the following number of prefixes:

(a) Mixed—400;
(b) CW—300;
(c) Phone—300;
(d) SSB—200.

Endorsements are issued for each 50 additional prefixes worked. Band endorsements are available for working the following numbers of prefixes on the various bands: 1.8 Mc., 35; 3.5 Mc., 150; 7 Mc., 250; 14 Mc., 300; 21 Mc., 300; 28 Mc., 250.

Continental endorsements are given for working the following numbers of prefixes in the respective continents: N.A., 126; S.A., 88; Eur., 146; Af., 80; Asia, 68; Oc., 51.

The definition of a prefix is:

(a) The two or three letter/numeral combination which forms the first part of the call (e.g. GM7OP counts as GM7; A2CAA as A2);
(b) A suffix designating portable operation in another area—if the suffix is the normal prefix used in that area (e.g. ZD8J/W6 counts as W6);
(c) Calls without numbers are considered as the first two letters followed by figure 0 (e.g. W4BPD/LX counts as LX0; RAEM counts as RA0).

Any prefix will be considered legitimate if its use was authorised by the governing authority. Cards need not be sent, but **must** be in the possession of the applicant. Any or all cards may be requested by the WPX Committee. All applications for WPX must be submitted on the official forms No. 1051, obtained by sending s.a.e. (pref. 8½ x 11 inch envelope or bigger) with one I.R.C. to WPX Committee, 14 Vanderventer Ave., Port Washington, L.I., N.Y., 11050, U.S.A. All contacts must be made with licensed, **land based**, Amateur stations in authorised Amateur bands. All contacts submitted by the applicant must be made within a 250-mile radius of the original location.

Good prefix hunting!

SUMMARY

Acknowledgments to: DX News, ZL2AFZ, LIDXA, VK4PX, "CQ" Mag., GC8HT, VK3AEJ and L6042.

73 and good DX.

—Peter VK3APN.

VHF

Sub-Editor: CYRIL MAUDE, VK3ZCK
2 Clarendon St., Avondale Heights, Vic., 3034

The only real news this month is that the VK6 v.h.f. beacons on 2 metres have been heard in VK3. Other things of note are that the VK3 6 and 2 mx converters are selling fast. All orders should be sent to the VK3 Disposals Committee, enclosing a cheque, postal order or cash in a registered letter.

Rumours have it that the VK3 V.h.f. Group are working on a 432 Mc. converter and a range of v.h.f. pre-amplifiers.

I would appreciate news from correspondents in other States.

73, Cyril VK3ZCK.

VICTORIA

Activity in VK3 is on the increase on 6, 2 and 0.7 mx, and interest in the V.h.f. Group activities has grown immensely. Functions such as the 2 mx scramble, 2 mx fox-hunt, field days, group meetings, etc., have been very well attended.

The latest project the Group has started on is the establishment of two v.h.f. beacons—one on 2 mx and the other on 432 Mc. It has been suggested that these beacons not be sited on a local mountain top, but in the metropolitan area. Lucky or otherwise, we do not require a beacon on 6 mx as we already have ATV Channel 0. Peter VK3ZYO is chairing a group consisting of VKs 3AUR, 3AOT, 3ZSB, 3ZGS, 3ZKD, 3ZYP, 3ZMU, and 3ZKB. A large amount of work will have to be done to produce, test and instal these beacons.

6 metres is still good for those who are patient enough to tune around the band. JA3 and JA1 have again been heard in Melbourne, whilst VK4s and VK2s can still be worked. One VK4 was heard to work a KH6, but alas, no sign of this juicy piece of DX was heard in VK3.

A report from a friend of mine in W6 indicates that DX of 1,400-3,000 miles is quite common in winter in W-land. Apparently the system in use over there is to point beams at the Northern Lights (Aurora Borealis) and use c.w. Although they are permitted to use one kilowatt over there, it should be possible over here by using the Aurora Australis as the reflecting layer and it could make possible winter DX to VK5, VK6 and possibly VK7. (The Taswegians would have a much better likelihood than those on the mainland.) If anyone is interested, would they please contact me via the Institute.

2 metre activity is high with many new stations appearing on this band, but the amount of DX around is very disappointing.

A report from Ron VK3AKC and Cyril VK3ZCK of hearing the VK6 2 mx beacon has been confirmed by a similar report received from George VK3ASV (ex VK3ZCG). So it looks like W.A.S. on 2 metres is a possibility and not a pipe dream after all.

432 Mc.: No reports have been received for this band, but it is believed that it is almost as active as 2 mx.

73, Robert VK3AUR.

Gippsland.—The VK3 Eastern Zone is planning to instal a two mx translator on Mt. Tassie in Gippsland. Frequencies and other details will be given as soon as P.M.G. and W.I.A. approval have been obtained.

The Zone has decided to use 2 mx f.m. Channel B as the main f.m. net frequency, as in some areas severe interference from the local t.v. channels makes Channel A impossible to use as a net. Channel A is still being used but only over short paths and as a second channel.

A tape recording of the recent East-West 2 mx opening was made by George VK3ASV which included signals from the VK6 2 mx beacon and the VK5 2 mx beacon.

73, George VK3ASV.

AMATEUR FREQUENCIES:

ONLY THE STRONG GO ON—SO SHOULD A LOT MORE AMATEURS!

Overseas Magazine Review

"BREAK-IN"

October 1968—

S.s.b. Transceiver, by ZL4IO. Designed primarily for use in mobile operation, the unit uses transistors except for the p.a. which is a pair of 6AQ5s in AB1. P.e.p. output is about 12 watts and a 455 Kc. sideband generator is used. The Moorabbin unit described in "A.R." appears to be much more versatile in that constructors can start with one band and add others as necessary. The low i.f. used means that multiple conversion would be a necessity if higher frequency bands were to be covered.

Slow Scan Television, by ZL2TAR. The author describes a system of slow scan television he uses on the h.f. bands. With one of these, you can see what your contact looks like!

November 1968—

Dual Gate FET 2 Metre Converter, ZL4LV. Small unit using 3N140, 3N141 and AF178 transistors—of interest to v.h.f'ers.

500 Kc. Spaced Synthesiser, ZL4IO. Part 3 of the article. A very interesting and quite complex construction for the experienced Amateur.

Using An Integrated Circuit, ZL1WL. Describes how to make a complete a.f. amp. with high impedance input of 50 mV. which will give 200 mW. output from a 6v. source. Type R.C.A. CA3020.

An FET Gate Dip Oscillator, ZL1BEB. Small, portable, low powered unit for 1.5 to 100 Mc. in four ranges.

December 1968—

Heterodyne Frequency Sub-Standard. Dr. "Farad" Foit and Toni ZL2BEV. One way of using up some of the surplus valves which are still available is to build a crystal controlled sub-standard with divider circuits to give outputs at 100 Kc. and 10 Kc. intervals for calibrating your gear.

Eight-Valve S.s.b. Exciter for 3.5-4 Mc., ZL-2RI. This valve exciter is similar to a number of designs which have been described since about 1953 when one of the first units using the FT241A crystals appeared in "QST". A cascoded half lattice filter is used and this can be on any frequency between 370 and 517 Kc. The author's was on about 510 Kc.

Combined Crystal Oscillator and Multipliers, ZL375. Describes a twin triode oscillator using a 24 Mc. crystal and with output on 144 Mc. Simple and easy to get going using 12AT7 or 6SL7 tubes.

F.M. for the Two Metre Transmitter, ZL4TAJ. Describes a simple phase modulation adaptor for the two metre transmitter. Especially for those who have not purchased car phones.

Integrated Circuits, ZL4LV. The author discusses some ideas for using integrated circuits in s.s.b. circuits.

"CQ"

October 1968—

Amateur Radio Station Design, W9IOP. The author describes his ideal Amateur Station and how he filled half of a large room with racks of equipment. Australian Amateurs are likely to find the approach a little too expensive. One would not only need to be rich, but also devoted.

H.f. Conical Cage Antennas, W2EEY/1. Describes some work which was originally carried out for the Royal Canadian Air Force to develop wide-band h.f. dipoles. This could very well be of interest to Amateurs in some areas. So far as I know, although the author gives the impression that the work is original, I do not think it is. It is understood Marconi Co. in England did some work either during or after WW2 which they abandoned because they could not achieve the desired 10/1 bandwidth. Ever since I have worked for Electronic Industries (1955), I have been aware of designs by Rhode & Schwarz which did give the desired 10/1 bandwidth and are built for many frequency ranges.

The Signal Souper. K. K. Dobler uses noisy signals to "key" an a.f. oscillator to regenerate the received signal and obviate the necessity for us to use our ears as a selective filter. He says it works like a charm. I wonder whether this is really so because the ear and brain combined probably constitute a better selective system than the device which could produce errors.

Use and Abuse of Current Overload Protective Devices, W2EEY/1. The author describes the characteristics of various types of fuses and circuit breakers. Don't laugh, but I think it should be compulsory reading for all in electronics.

Vertical Antennas, W3JM. Part V. of the series which has been run in "CQ" over the last few months. Part VI. will appear in the November issue. This issue deals mainly with stacked verticals of various types to provide gain by narrowing the radiation lobe and generally decreasing its angle.

Improved Carrier Suppression for the HX-20. The Heath unit qualifies for a modification.

A 700 Watt P.e.p. Dummy Load (for about $2), WA8ZJH. The author found someone who was willing to sell him seven 50 watt non-inductive resistors with a nominal value of 344 ohms each which could be paralleled to provide a steady dissipation rating of 350 watts or 700 watts p.e.p. He got these for $US1.75 and even gives the seller's address.

The Corston Affair, Sylvia Margolis. Sylvia tells in her usual racy style how a British Amateur coped with a t.v.i. complaint. Amusing and probably earned her enough to buy her husband a new rig.

Trapless Trap Dipoles, W2EEY/1, or perhaps it should be more correctly titled "Stubs are Traps". It is still an interesting concept and whilst some of us might boggle at adjusting traps for correct operation, perhaps we can more readily see what we are doing when a piece of open wire line is involved. Shades of G4ZU!

The Ins and Outs of Good Soldering, W7CCG. The fine art of soldering for the newcomer and old-timer.

The Hammarlund HQ-125, "CQ" Staff. This is a very interesting solid state receiver which covers all h.f. Amateur bands in 200 Kc. segments and has eleven "spare" positions for other 200 Kc. segments between 3.4 and 30 Mc. Selectivity 0.5, 2.1, 6 Kc. Notch filter and many other features. Price $US529.50. (Here one could expect to pay about $A1060.00.)

That Extra Input, W3KBM. How to add a high level input circuit to that high gain a.f. amplifier. Could also be titled a simple audio frequency mixer using a pentode tube. Although the input impedance is high into G1 and G3, the tube gain is different and one caters for low and the other high level inputs, e.g. mic. and tape recorder.

C.w. Transceive Operation with the Drake T4 and the R4A, WA6UFW. The units transceive okay on s.s.b. and a.m. but since the carrier is shifted into the i.f. passband the receiver tunes about 1.2 Kc. lower in frequency than the transmitter and Don Schliesser tells how he overcame this problem.

An R.f. Actuated Keying Monitor, J. I. Randall. How to make a simple monitor using a newly developed electronic module known as the Cordover CWM-1. Only connections are given and no information is included as to the circuit of the module.

How To Make Five Million (points that is), W1BIH. A group of ardent DXers get together to visit Curacao for a contest and score five million points. Nice work if you can get it.

A 40 Metre Linear, VE7BRK. Take one Command Transmitter (BC458) and two amplifier stages and you have a linear capable of 150 watts output when the three 1625s are fed from 750 volts and driven by a 250 mV. sideband signal. Seems that there is still a lot of life in the old Command transmitters, even in this day and age. I have seen circuits running up to 1250 volts on the anodes of 1625s in s.s.b. service.

November 1968—

A Transistorised R.T.T.Y. T.U., W7PVF. A small relatively simple and solid state—will interest the r.t.t.y. gang.

An Improved Multi-Band Mobile Antenna System, W2OZH. This antenna is claimed to show a considerable improvement over previous whips, etc. So it should, the "capture area" is greater and it uses an 8 ft. whip at each end of the 17 ft. car. May have to alter slightly for our 15 ft. models.

Vertical Antennas, W3JM. Capt. Paul Lee continues his exhaustive dissertation on this very interesting subject.

The Raytrack Auto-Level Volume Compressor, reviewed by W2AEF. Perhaps the use of these will cause some re-thinking in the design of s.s.b. finals and power supplies for the tubes and transformers used by the "floggers" will probably be shortlived with that extra 14 db. of signal.

Finding True Receiver Sensitivity, W2EEY/1. Rated receiver sensitivity is not always achieved in practice. The author discusses the ways of ensuring "weak ones" are copiable.

Contest Capers, VK4SS, Alan Shawsmith. His (??) experience of contest operating and the obstacles one has to overcome from XYLs, harmonics and interlopers. Another "A.R." reader who wants a new rig or something and has set about earning it with his pen in the U.S.A.

Digital Meters and Multimeters, W2EEY/1. A short article to acquaint Amateurs with the availability of such instruments, their uses, accuracy and cost. So far as is known, the cheapest 3 digit d.c. unit with an accuracy better than ½ per cent. available in Australia is about $500 plus tax—almost as much as a new transceiver.

Putting the Motorola FMTU-30D and FMRU-16 on Two, K7CNZ. A mod. article applicable to the U.S. scene, similar to "A.R's" conversion of MR3s, and other mobile radio telephone equipment for Amateur use. No interest here.

The Expanded Lazy-H Antenna, W2EEY/1. A simple version of the Lazy-H with improved gain and a more convenient feed impedance.

Simple Heater Voltage Regulation, W2AEF. From using VR tubes or Zeners, Wilf Scherer takes his readers to a somewhat more complex approach of the saturated core transformer. The editor adds a note that v.t.v.m's should not be used for voltage measurement because they are peak reading. Most multimeters with rectifiers suffer from this defect to a considerable extent also and moving iron thermocouple or hot-wire (true r.m.s.) instruments should be used for preference. An interesting article which could form the basis for a better Australian article. This is a subject every Amateur should know something about.

Experiments with Three Arrays on One Boom, Part 1 (in two parts), W6ZWK. Sam has taken a different approach to most authors on interlaced beams. He uses a 36 ft. boom with four shortened elements on 14 Mc., and three elements on 21 and 28 Mc. All tuning adjustments are made from the boom by remote operation, using slugs in the loading coils. Some good constructional hints, although why he didn't have four elements on all bands with that big boom I'll never know.

Natural Towers, W1RIL. If you have a handy pine tree in your back yard just clear a path up one side for a drive shaft and lop the top to clear the beam and away you go! The rotating equipment is at ground level. Seems this one could provide a headache for the local council as it wouldn't be "built". The tree is still allowed to grow and the beam is almost invisible from the ground—according to the author.

Shorty Twins—Louder Still, G2IS. The author describes an improvement on a ground plane vertical by using two, spaced a quarter wave apart, for 6 db. gain and a 120 degree radiation pattern with a low vertical angle of radiation. By using four and switching, a variety of patterns could be obtained including coverage in any 120 degree segment at will. Similar systems are commonly used in the U.S. with a.m. b.c. stations and a few have been installed in Australia.

A 2 kW. P.e.p. Linear Amplifier, W9MIJ/1. With four 4X150As, the author produced a table top linear for 7-28 Mc. on an 11 x 7 x 2 inch chassis around which he wrapped some perforated metal for a cabinet. He found his chassis was a little small for a bulge was necessary—a-la racing car bonnets to clear the loading capacitor when open and the cooling fan motor sticks up over the 4X150As like a sore toe.

"A Letter from Don Miller". According to the report which appeared in "QST" October 1968 and on p. 99 on Nov. "QST" both parties won the legal battle. Don's win appears to include a retraction of certain claims he made regarding operation from one or more of the claimed locations. "CQ" in their editorial "Zero Bias" describes the A.R.R.L. as "the largest commercial enterprise in Amateur Radio". This is as it should be for the A.R.R.L. profits flow back to members in the form of improved benefits.

Q. and A., W2AET. I always glance through these and sometimes find some merriment in either the questions or the answers. Wilf is very good, but some of his Questioners have never known or have forgotten the simplest theory.

"Determining S.s.b. Peak Power" is a very useful tip for Australians in this issue (p. 114). Remember the expression P.E.P. means Peak Envelope Power and this is **always** measured on the output side of the tx.

"RADIO COMMUNICATION"

October 1968—

G8ACC Mk. III. Solid State Transmitter. Three watts aerial power with low harmonic content on 70 cm. f.m. This is an article which could interest the v.h.f./u.h.f. men.

Technical Topics, Pat Hawker, G3VA. Discusses the "Hula Hoop" or "DDRR" antenna in its various forms with possible variations and anticipated performance of some as yet untried versions. Also discusses VE2IB's transistor v.f.o. circuit, an IGFET super-regen,

method of damping vibration in beam antennas and p.v.c. masts. On this latter score, your scribe has been looking askance at the prolific variety of rigid p.v.c. tubing now being produced and sold as conduit and water pipe and the fittings which are also available. This material may be markedly superior to bamboo for "quad" spreaders and other similar constructions and some of it appears to be rigid enough to use for booms in sizes above 1½ inch i.d.

G3GGK and G3EDD **Review the Heathkit SB101 s.s.b. transceiver,** and G2BVN reviews the **Omega-T Antenna Noise Bridge.**

Miniature High Performance Tuneable I.F., G3UJP. A 1.5-2.0 Mc. receiver for use as a tunable i.f. on all bands is described. This all solid state unit incorporates some very useful ideas which are likely to interest those amongst us who are really interested in building high class receiving equipment.

November 1968—

Semiconductor V.h.f. Power Amplifier using a Pi-Tank Circuit, G2HIF. The target was a 25w. c.w. 144 Mc. amp. which would not be too expensive. The design details are published here using two 2N3632s.

Technical Topics, G3VA. Discusses t.v.i. and the fact that for every problem there appears to be a cure which is as unique as the problem. He goes on to discuss a wide-range "Gate Dipper"—FET g.d.o. if you like, using an MPF102. W6PIZ's "Lazy Quad" follows. This is an antenna type which could have some advantages in small blocks. This is followed by paragraphs on Urban V.h.f. Noise, Schottky-Barrier Diode Front-End, I.F. Derived "Hang" A.g.c., Simple Meter Switching, a hint showing how a simple s.p.s.t. switch can be used for metering grid and cathode currents with an 0-1 mA. meter, Low-Cost APT Stations (seems that N.A.S.A. has a valuable publication SP-5079 entitled "Constructing Inexpensive APT —Automatic Picture Transmission—Ground Stations". Perhaps some of Bill VK3ABP's mates would like to send 50c to "The Clearinghouse for Federal, Scientific and Technical Information," Springfield, Virginia, 22151, U.S.A., for a copy of this 60-page booklet), Slow Scan TV, V.h.f. and V.h.f. Propagation, and Two Voltage Stabilisation Tips concludes Pat's offering for the month.

G8ACC Mk. III. 70 CM. F.M. Solid State Tx. This completes the series and should interest some of our 432 Mc. men.

Miniature High Performance Tunable I.F., G3UJP. Part 2 continues the description commenced in October issue. Your reviewer could not get wildly enthusiastic about this device—seems to him that a better approach is a 5.5 or 9 Mc. i.f. device. However, when well built they'll all give good performance and it takes all sorts to make a world.

"RADIO ZS"

September 1968—

Transistor Dip Oscillator, ZS1MM. The article is written in Afrikaans and although not easily readable, the circuit and drawing are understandable. Uses OC171/OC71.

There is another short Afrikaans article on what appears to be a tuning device for an 80 mx whip using a "Terry" clip to hold it in place.

"SHORT WAVE MAGAZINE"

October 1968—

Economical Five-Band Linear Amplifier, G3SQR. Author describes easily built linear using four PL500 or PL504 tubes. The amplifier runs about 525 watts peak d.c. input and could be expected to give an output of a little over 300 watts p.e.p.

Transistor Transceiver for Two Metre Portable, GW3UUS. Transmitter is crystal controlled on one fixed frequency and uses three transistors. Receiver is a super-regen. type using two transistors. Both tx and rx share a common a.f. amplifier unit.

Considering the Hallicrafters SR-400. Staff review of this transceiver, and the companion HA-20 DX Adaptor.

November 1968—

Getting on Four Metres, G3TDZ. Transistorised circuitry and construction notes. This article may interest some of our 6 mx men.

Variations on the HE-30 Theme, R. W. Bunney. This fellow changed his r.f. stage to a cascode using a twin triode ECC84 and did sundry other modifications in an effort to improve this well known receiver. S.w.l. interest.

Ideas for an El-Bug, G3XSE. Simple electronic bug. This circuit uses only two transistors as switches to manipulate a relay with r.c. timing circuits. The unit is simple and effective.

/MM in Witchcraft, G8BJP. The author is operator/navigator aboard a friend's 30-foot yacht and tells of his experiences.

R.T.T.Y. Station Control Simplified, G8LT. This article seems to be of a type which could interest a number of VK Amateurs because it uses equipment which is more likely to be available here than the American equipment described in U.S. publications.

"73 MAGAZINE"

October 1968—

A collection of Thoughts on Receiver Design, WB6BIH. Tips for the builder.

Three Tube Superhet Short Wave Receiver, W6ELJ. Performs like a six tube hearing aid.

The MO Receiver, K5WYG. This one will have you burning the midnight oil.

Project Facsimile Antarctic, K6GKX. Morale booster in the cold continent.

A High Performance Receiver for 2 Metres, W2HUX. A v.h.f'ers dream receiver.

Ham Workshop, W0PEM. The bare essentials to work on the gear.

New Life for an Old Circuit, Thorpe. Reviving the Vackar V.f.o.

V.h.f. R.f. Noise Suppression, K6ZFV. Mobile noise—good tips for h.f. too.

Reviewing the SR-400, W2NSD/1. Hallicrafter's latest transceiver is great.

FET Converters for 50 Mc., WB6YVT. Six metre converter that works.

Neutralisation, K6EAW. What neutralisation is all about.

The Q Q Meter, WB6IBS. The measurement and importance of "Q".

2 Metre Ground Plane, WB6BIH. Never under-estimate the ground plane. Author apparently has not seen those nice four-way screwed conduit boxes which come with covers and by the addition of four pieces of screwed conduit . . . there it is. Much easier than building boxes and drilling holes all over the place. This remark applies to 6 metre ground plane.

Improving Stability in Older Receivers, W6NIF. Good tips on making them solid.

Six Metre Ground Plane. Novel construction idea. See 2 metre remarks above. This was the article I was thinking of when I mentioned the boxes. The conduit boxes will also be useful for six.

V.h.f. Monitor, W4KAE. Keeping in touch with the group.

Simplified db. Levelling, W2DUD. A.l.c. and a.g.c. circuits.

F.m'ing a V.f.o. F.m. doesn't have to be crystal.

FET Pre-Amplifiers, W2EEY/1. Boosting receiver performance.

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FOR SALE: National Radio Company (U.S.A.) 10-valve Communications Receiver, NC190. Double conversion, 540 Kc. to 30 Mc. in five bands with bandspread, crystal calibrator and matching speaker. In-built BFO. Comes with 240-110v. step-down transformer. $150 o.n.o. Contact Mr. F. L. Cooper, 33 Beagle St., Red Hill, A.C.T., 2603. Ph. 94778.

FOR SALE. New KWM2 Mobile Mounting, complete with cables, 35102, $80. A. Swinton, P.O. Box 1, Kulnura, N.S.W., 2251.

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FOR SALE: UM2 Mod. Tranny, 60w. audio, 120w. r.f., $25. Geloso VFO, 4/102, complete with cal. dial, escutcheon and tubes (6J5G, 6AU6, 6L6), $20. Graham McPhee, VK2AYE, Phone 528-8825 (Sydney).

FOR SALE: 20 metre AM, rack mounted, VFO controlled Transmitter with power supply, $40. Also home-made 2JU Receiver, $15. Plus other parts. L. Pinkevitch, VK2QB, 20 Catherine St., Kotara South, N.S.W., 2288.

SALE: Yaesu Musen FL200B Transmitter, FR100B Receiver, matched for separate or transceive conditions. All bands plus WWV, 100 Kc. Cal., provision for other bands, in as new cond. with handbooks, speaker and mic., in original packing cases. $575 o.n.o. for both, will separate. R. J. Richards, VK2BRR, 49 Ourimbah Rd., Mosman, N.S.W., 2088. Phone 96-7252

SELL: Collins 75S3B serial number 15579. This receiver is the latest in the "S" Line series. It is less than 12 months old and has been used very little due to my absence abroad most of last year. Immaculate, as new condition. $675. Roth Jones, 1 Albert Rd., Melbourne, Vic., 3004 (Phone 26 6911).

WANTED: Receiver, general coverage type. Lafayette, HE30, or similar. Price and details, etc., to Howard Anders, VK3AYV, 325 Waverley Rd., Mt. Waverley, Vic., 3149. Phone 277-1207.

WANTED TO BUY: Transistor, preferably 20w., must be very reasonable. May require linear to match. If not, what can you offer? Phone 91-2297 Brisbane. Urgent. VK4IM, J. D. MacLean, 89 Thorn St., Kangaroo Pt., Brisbane, Qld., 4169.

$100 REWARD is offered for information leading to the recovery of Collins KWM2 Transceiver, S/N 1284. Information in confidence to Harold Burtoft, 114 Links Ave., North Strathfield, N.S.W., 2137. Telephone: Business Hours 55-0433, Residence 73-2369.

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Antenna Input: 50-400 ohms impedance.
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V5—6BA6 2nd IF Amplifier.
V6—6BE6 Product Detector.
V7a—6AQ8 Beat Frequency Oscillator.
V7b—6AQ8 1st AF Amplifier.
V8—6AQ5 Audio Output.
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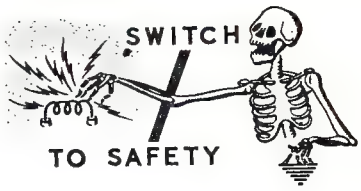

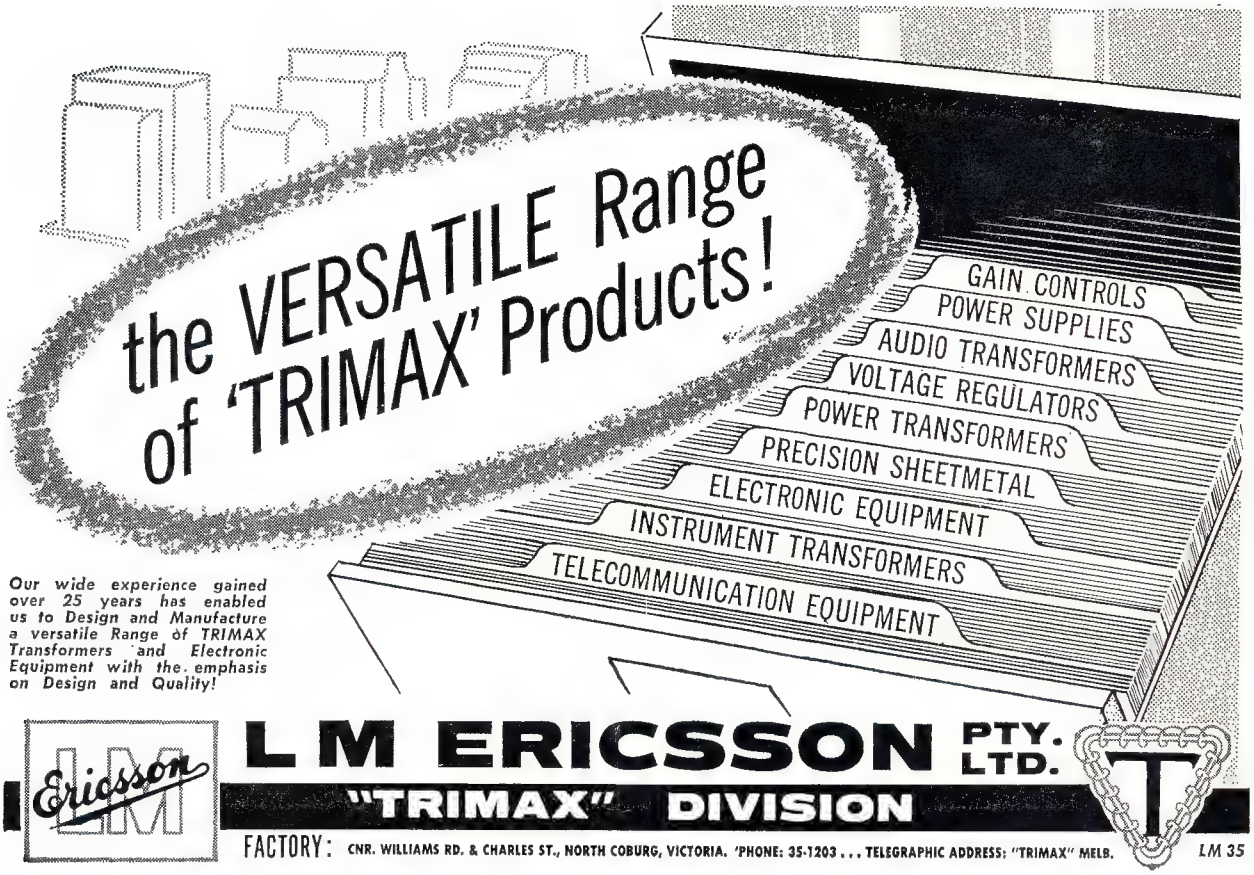

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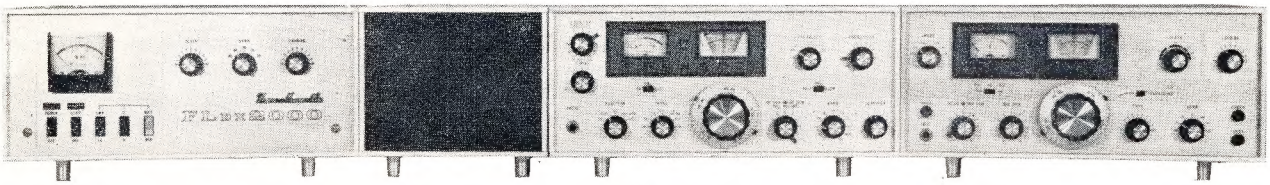
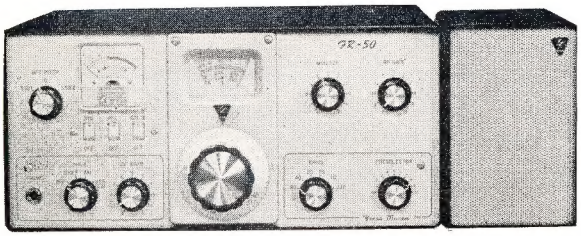


FLDX-2000 Linear Amp.
80-10 mx, AB2 G.G.

SP-400 Speaker

FRDX-400 Receiver
160-2 mx, WWV, C.B.

FLDX-400 Transmitter
80-10 mx, peak in. 300w.



FR-50 Receiver
80-10 mx, WWV

SP-50 Speaker

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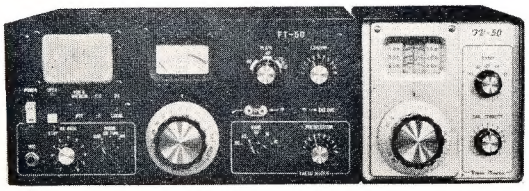

FT-50 Transceiver
80-10 mx, peak inp. 100w.

FV-50 V.F.O.

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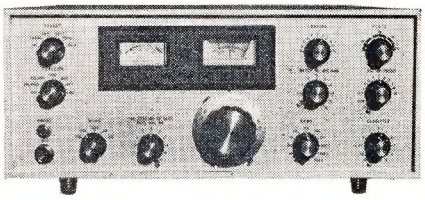

FTDX-400 Transceiver
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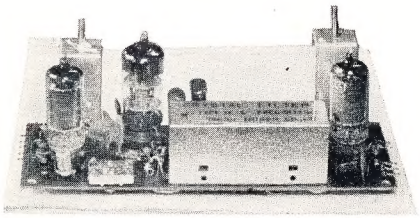

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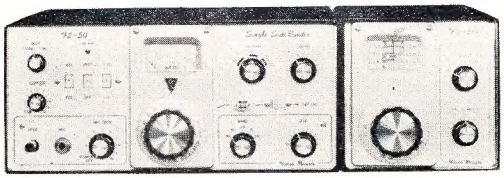
Basis for Tx Construction



FL-50 Transmitter
80-10 mx, peak inp. 125w.

FV-50 V.F.O.

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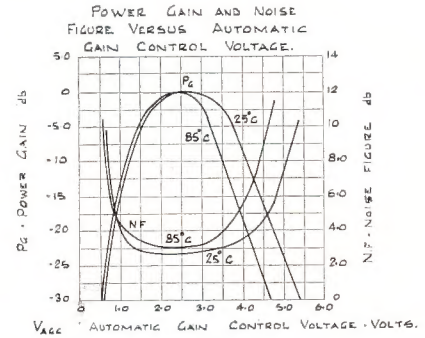
AY 1119. NPN Silicon Planar Transistor for use in RF-IF application featuring high power gain.

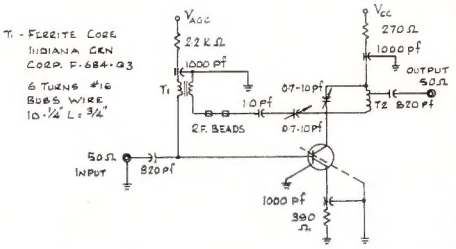
AY 6105. NPN Silicon Planar Transistor designed for small signal RF and IF Amplifier. Low feed back capacitances make it especially useful for unneutralized amplifiers and high stability oscillators.

SE 5001. NPN Silicon Transistor designed specifically for commercial RF-IF-AGC application featuring high power gain, low noise and excellent forward AGC characteristics.

SE 5006. NPN Silicon Transistor designed for RF application featuring low feed back. Cob. 1.6 pF max. high power gain and low NF.

SE 5020. NPN Silicon Transistor is a high gain low noise RF type with forward AGC characteristics. Ideal for HF and VHF small signal amplifiers.





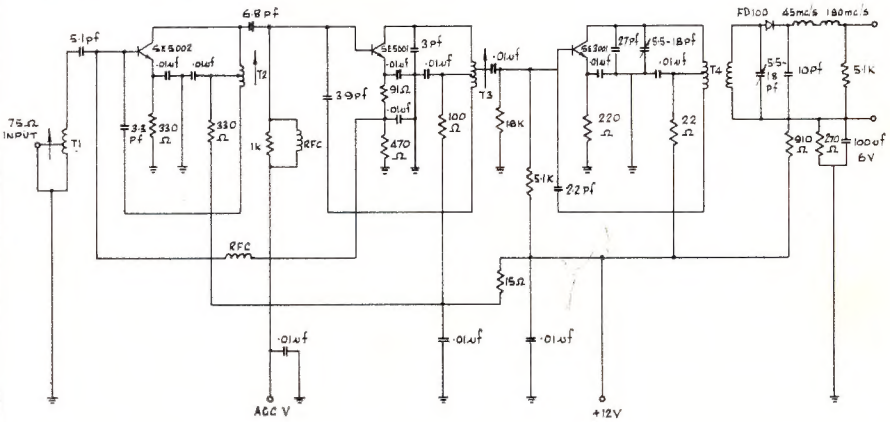
SCHEMATIC DIAGRAM OF 45mc/s I.F AMPLIFIER

T1 19 TURNS #36 ENAMELED WIRE TAPPED 3 TURNS FROM GROUND WOUND ON MICROMETALS L52-6 SHIELDED COIL FORM.

T2 12 TURNS #36 ENAMELED WIRE TAPPED 10:2 WOUND ON MICROMETALS L52-6 SHIELDED COIL FORM.

T3 14 TURNS #36 ENAMELED WIRE TAPPED 10:2:2 WOUND ON MICROMETALS L-52-6 SHIELDED COIL FORM

T4 PRIMARY 6 TURNS #36 ENAMELED WIRE TAPPED 4:2 WOUND ON SKELES FORM #217-5401-1 SECONDARY 8 TURNS #36 ENAMELED WIRE WOUND ON ADJUSTABLE SLEEVE SOUND TRAP ON ADJUSTABLE SLEEVE.



Electrical Characteristics at 25°C.

Type No.	LVCEO @ IC mA Volts	VCE (Sat) @ IC/IB Volts	hFE @ IC mA/ VCE = Volts	Pg AGC*	NF dB	Cob @ V PF	or Cre @ V PF	fT MHz	Tot. Pwr. @ 25° C.A. mW.
2N 3137	20	0.3 @ 50/5	20 min. @ 50/50	7 dB @ 250 MHz		3.5 @ 10		750 typ.	600
2N 3563	12	0.1 @ 10/1	20-200 @ 8/10	17 dB typ. @ 200 MHz	4.0	1.7 @ 10V		900 typ.	200
AY 1114	20	0.5 @ 50/5	60 min. @ 1/0.1		6.0	4.5 max.		550 typ.	200
AY 1119	15	0.3 @ 10/1	35 min. @ 10/1			4.0 max.		400 min.	200
AY 6105	30	3.0 @ 10/5	20-200 @ 4/5	Pg @ 60—450+800 MHz	8 @ 800 MHz		0.5 @ 10	425 min.	200
SE 5001	40		30 min. @ 4/10	8 mA AGC @ 45 MHz		1.6 max.		400 min.	200
SE 5006	40	2.0 @ 10/5	30 min. @ 4/10	10.5 mA AGC @ 100 MHz	5.5 typ.	1.6 max.		600 typ.	200
SE 5020	20	3.0 @ 10/5	20-200 @ 4/5	28 dB Pg @ 200 MHz 5 Vagc @ 200 MHz	2.8 typ. @ 200 MHz		0.5 max.	375 min.	175

*For further information please ask for Data Sheet.

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- Nuvistor RF amplifier.
- Provision for crystal locking of the transmitter.
- 12 volts DC (internal transistor power supply) and 230/240 volts AC operation.
- Noise limiter and squelch.
- 17 tubes, 4 transistors and 7 diodes.
- 1 microvolt sensitivity for 10 db. S/N ratio at 146 Mc.
- :"S" meter, RF output meter, and "netting" control.

Price: $282.00

MILLER 8903B PRE-WIRED I.F. STRIPS

455 Kc. centre frequency, 55 db. gain, uses two PNP transistors and diode detector. Bandwidth 5 Kc. at 6 db. DC requirements: 6 volts at 2 mA.

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Plus pack and post 25 cents

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ATS25 ceramic base 807, **70c** or **three for $2.**
815, **70c.**
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VR150/30, **75c** or **3 for $2.**
QB2/250 (813), new and boxed, **$7 ea.**
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$2 per 100
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80 for $2
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STAR ST-700 TRANSMITTER

SSB — AM — CW
80 Metres to 10 Metres

- Ultra-precision three-stage double gear tuning mechanism, completely free of backlash, spreads each 600 Kc. over 1.68 metres with 1 Kc. dial calibrations.
- Stability better than 100 cycles. "Vackar" type VFO. Voltage regulated power supply.
- Uses mechanical filter at 455 Kc. specially designed for SSB. Selectable upper or lower sideband. Carrier and sideband suppression 50 db. or more.
- May be connected with STAR SR-700A receiver for transceive operation.
- Fully adjustable VOX and ANTITRIP circuits for automatic transmission/reception.
- Press-to-talk relay, break-in keying and sidetone oscillator for CW monitoring.
- Automatic level control circuit assures high quality distortion free SSB.
- Built-in antenna relay.
- Final stage uses two 6146s in parallel with conservatively rated input of 250 watts PEP on SSB and CW, 100 watts on AM.
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- Power supply 220 to 240 volts AC 50 cycles.

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STAR SR-700A RECEIVER

SSB — AM — CW

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- Stability better than 100 cycles. "Vackar" type VFO. Voltage regulated power supply.
- Triple conversion. IF's 1650 Kc. and 55 Kc. First and third oscillators crystal controlled.
- Imagine ratio better than 60 db. on all bands. Beat interference below noise level.
- Variable selectivity band pass filter at 55 Kc. provides steep cut offs and a good shape factor. Four positions: 0.5, 1.2, 2.5 and 4 Kc. (at 6 db. down).
- T-notch filter provides better than 50 db. attenuation.
- Variable decay AGC. Variable BFO tuning.
- Output terminal on VFO for transceive operation.
- Product detector for SSB/CW. Diode detector for AM.
- Noise limiter with adjustable clipping level operates on AM, SSB and CW.
- Built-in 100 Kc. crystal calibrator (crystal included). Zero adjustment on VFO.
- Sensitivity better than 0.5 uV. for 10 db. S + N ratio on SSB and CW, better than 1 uV. on AM.
- Power output, 1 watt. Impedance, 4 ohms.
- 13 tubes, 6 diodes.

Price: $461.50

MARCONI TF885A VIDEO OSCILLATOR

Price: $120

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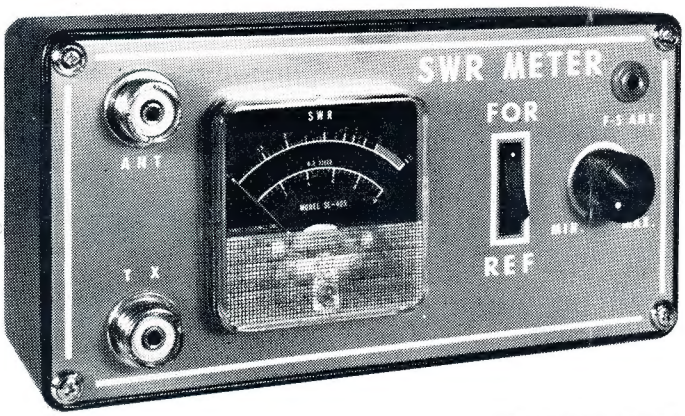

The SE405 Standing Wave Ratio Meter is indispensable to the Amateur Radio Station, Two-Way Radio Servicemen, etc., operating from 1 to 150 Mc. at 500 mW. to 2 kW p.e.p.

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Frequency Range: 1 to 150 Mc.
Insertion Loss: < 0.2 db.
Detectable SWR: From 1 : 1 to 1 : 10.
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